DOCUMENT RESUME

ED 115 691 95 TM 004 965

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TITLE A Vocational Re-Evaluation of the Base Year Survey of the High School Class of 1972; Part 1: Selected Characteristics of the Class of 1972. Final Report.
INSTITUTION Educational Testing Service, Princeton, N.J.
SPONS AGENCY Office of Education (DHEW), Washington, D.C. Office of Planning, Budgeting, and Evaluation.
REPORT NO ETS-PR-74-23
PUB DATE Oct 74
CONTRACT OEC-0-73-6806
NOTE 205p.; For related documents, see ED 097 368-372, 103 452-453, 111 850 and 886, and TM 004 910 and 966

EDRS PRICE MF-$0.76 HC-$10.78 Plus Postage
DESCRIPTORS Academic Achievement; *Comparative Analysis; Federal Programs; Financial Problems; *High School Students; Longitudinal Studies; *National Surveys; Post Secondary Education; Racial Differences; Remedial Instruction; Secondary Education; *Seniors; Sex Differences; Socioeconomic Status; Student Ability; *Student Characteristics; Student Participation; Teaching Methods; Vocational Education
IDENTIFIERS *National Longitudinal Study High School Class 1972

ABSTRACT

The eight reports brought together here were based on data collected for the base year of the National Longitudinal Study of the High School Class of 1972. Minor but systematic biases were present in the data since certain schools and students did not participate in the study. The accumulative effects of bias emphasize the need for care in analysis and interpretation. The class of 3 million persons consisted of about 82 percent white, nine and one-half percent black. About half of the white students were enrolled in academic curricula, compared to a quarter of the black students. Close to half of the black students were enrolled in general curricula, compared to 29 percent of all white students. In a set of six tests, females slightly outperformed males, academic students outperformed other students, and blacks scored about a standard deviation below whites. The socioeconomic status (SES) of academic students was higher than general students who had a slightly higher SES than that of vocational/technical students. Blacks had lower SES than whites. Students in federal programs scored higher than others in the same curriculum who did not participate in federal programs. Significant differences were seen regarding exposures of various students to various special teaching techniques. About one-third of the sample may face a financial barrier to continued education. Remedial instruction was more frequently provided to blacks than to whites, to general and vocational students than to academic students, and to more males than to females. (RC)

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ED115691

PR-74-23

Final Report

Contract No. OEC-0-73-6806

A VOCATIONAL RE-EVALUATION OF THE BASE YEAR SURVEY OF THE HIGH SCHOOL CLASS OF 1972

PART I: SELECTED CHARACTERISTICS OF THE CLASS OF 1972

F. Reid Creech, Project Director

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Educational Testing Service

October, 1974

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TM 004 965

U. S. DEPARTMENT OF
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PREFACE

During the Spring of 1972 a large-scale survey of the senior high school class (class of 1972) was conducted throughout the United States. The purpose of the survey was to gather base year data as the first stage of a 6 to 8 year (approx.) longitudinal study. Instrumentation for the base year study was developed and field tried by the Research Triangle Institute, the sampling plan was designed by Westat, Incorporated, and the field work and construction of the computer data files were performed by Educational Testing Service. The first analyses and summaries of the data appeared in an 8-volume report titled, The Base-Year Survey of the National Longitudinal Study of the High School Class of 1972, by Hilton, Rhett, Creech et al., 1973 under Contract No. OEC-0-72-0903, for the U. S. Office of Education.

These analyses and tabulations, while voluminous, barely began to explore the possibilities for meaningful analysis owing to the large quantity of data gathered. The current study increases the depth of exploration somewhat, but also fails to exhaust the possibilities.

Since the possibilities for exploration are so great the current study has been strongly targeted into three specific areas of analysis, and within each area, further confined to issues which are of direct concern. Each area of analysis will be separately reported, with contents which might be described briefly as follows:

1. Educational characteristics of students and selected univariate explorations.
2. Multivariate explorations distinguishing Vocational/Technical students from others.
3. Student vocational and educational plans and aspirations.

This report is the first of those listed above and actually represents a collection of 8 smaller studies. The proper interpretation of these studies depends largely upon the reader's understanding of the nature of the data on which the analyses were conducted.

The sample design used for the collection of data was a two-stage stratified sample with different selection probabilities assigned to different students. Stage sampling presents a great administrative and cost advantage over many other forms of sampling but can sometimes produce imprecise results. Stratification can often produce highly precise results, however, so that the combination of the two methods hopefully gives something of the best of both worlds--high precision and low cost. Historically, the precision levels produced by such sample designs in an educational setting has been somewhat worse than that which would result from a simple random sample (SRS) of the same number of students; the variances which result are often 10% to 20% larger than the corresponding SRS variance.

This disadvantage is offset in the current study by the large number of students selected (17,726) which provides sufficient precision to allow very small effects to be detected. The numbers of students is so large in many comparisons that one must be constantly mindful of the magnitudes of the effects being considered. Frequently, one will observe statistically significant results for which the effects are so small as to be of little practical importance. Where reasonable to do so, the magnitudes of effects have been provided to facilitate this judgment.

Unequal selection probabilities presents a complication to the interpretation of results. The proportion of students in the sample who possess some attribute bears little overt relationship to the proportion to be found

in the population. In consequence, characteristics of the sample are seldom useful. This problem has been overcome by adjusting sample data so as to yield estimates of population characteristics which then become the basis for discussion. Since subsample sizes are frequently so large as to render standard errors almost negligible, the emphasis on characteristics of the population produces a census-like impression of the study. On balance, such an impression is probably warranted, provided that one bears in mind that the study was not a census and that the instruments used for data collection sometimes contained low validity components. Where validity or reliability was especially relevant to a discussion an effort was made to provide whatever information was available.

Effort was also made to avoid an unnecessary proliferation of tables of means, standard deviations, subsample sizes, and the like. Numerous carefully drawn figures present data and results in suitable detail, hopefully in a form which can be readily grasped. In the special case of cumulative "less than" distributions the median and interquartile range can be read with fair accuracy from the graphs.

On occasion, two or more statistical methods might have been (and sometimes were) applied to a set of data to accomplish the same purpose. In such circumstances little difference in results is to be expected and where two or more methods were applied the results were quite similar. Since choice of method often was not critical methods of broad applicability could be used. All of a set of tests could be performed in the same way, allowing a more uniform exposition of the results.

If pressed for time, the reader may prefer to read the final chapter which summarizes the reports. Nonresponse biases have been detected in the sample; the reader may, therefore, prefer to read the first chapter prior to reading others.

The author wishes to express his appreciation to Ms. Martha Stocking and Ms. Judith Pollack-Ohls for their fine systems coordination and programming support, and to Mrs. Helen Westerberg for the preparation of the manuscript.

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CHAPTER 1

NONRESPONSE BIAS EFFECTS

INTRODUCTION

Two types of nonresponse bias may be studied within the data. The first type, bias due to schools or students that did not participate in the National Longitudinal Study, has been discussed in the NLS Final Report (1) and will not be further analyzed here. The earlier report indicated that low response rates of schools was often found in small schools (under 300 enrollments), often in the South, often in rural locations. When a school did not participate in the study, the sample of 18 seniors in that school also could not respond. In schools which did participate, however, some students did not. For such students it was usually possible to obtain information from the School Record Information Form (SRIF), and to compare the characteristics of nonparticipant students with those of students who participated. The resulting comparisons indicated that

> ...the participating student seems to be more academically oriented, higher in his classs, less mobile, and less likely to be afflicted with learning disabilities than nonparti ipants.

It was further indicated that while the biases between participants and nonparticipants seem to exist they are often small in magnitude. The response rates obtained in the survey were as follows:

School Questionnaire	87%
SRIF	85
Counselor Questionnaire	83
Student Questionnaire	76
Student Test Battery	72

While the response rates are low enough to permit bias to exist, they are apparently high enough to constrain the magnitude of bias to an acceptable level.

The second type of nonresponse bias is concerned with the differences between participating students who either did or did not complete the survey instruments. This form of bias--the bias created by the partial participation of students--is the topic of this chapter. Two approaches are used to evaluate and characterize the bias; the first is based on the response patterns of students within the Student Questionnaire, the second examines various groups of full and partial participant students through SRIF comparisons.

PARTIAL PARTICIPATION BIAS EFFECTS

Student Questionnaire Branching

The Student Questionnaire used in the National Longitudinal Study contained 11 separate sections, some which were to be answered by all students, others which were to be answered only by certain students. The instructions in the questionnaire provided 18 possible correct combinations of sections, one of which would have been selected by the student, and which would serve to typify him. We will refer to the particular combination of sections which a student may have selected as the student's "path" through the questionnaire. The types of students which were to select particular questionnaire sections are shown below:

Ques. Sect.	Type of Student Who Should Respond
A	All students
B	All students
C	All students
D	Students planning to work full time during the year after they leave high school
E	Students planning to enter an apprenticeship or on-the-job training program during the year after they leave high school
F	Students planning to enter military service during the year after they leave high school

Ques. Sect.	Type of Student Who Should Respond
G	Students planning to be full time homemakers during the year after leaving high school
H	Students planning to take vocational or technical courses at a trade or business school full or part time during the year after they leave high school
I	Students planning to go to a four-year college or university, junior or community college, or take college-level correspondence courses during the year after leaving high school
J	Students planning to work part time during the year after leaving high school
K	All Students

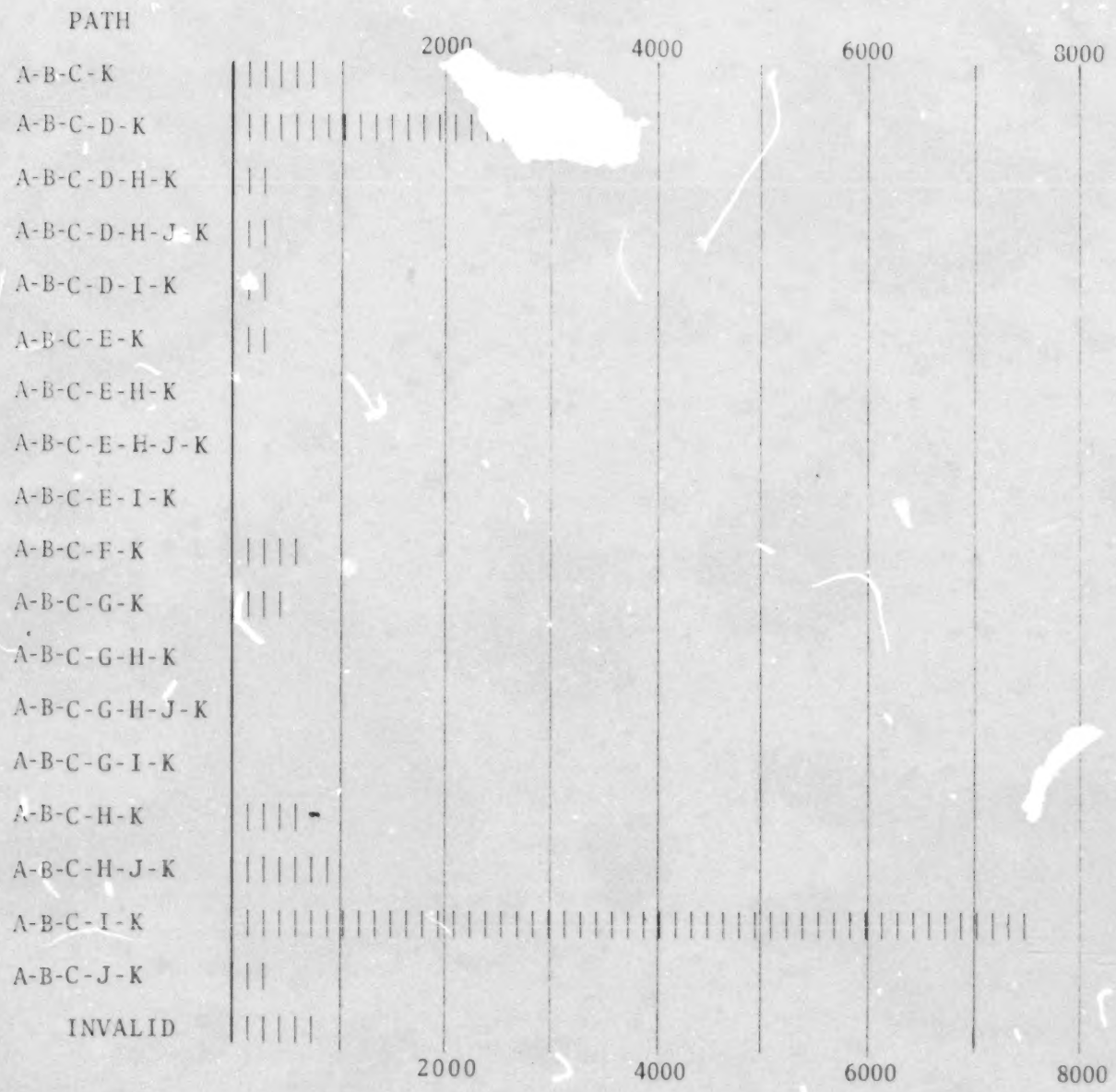
Thus, a student who planned to go to college part time and to work part time during the year after leaving high school would probably have selected the A-B-C-I-J-K path.

As is often found in questionnaires containing branches, some students failed to follow a proper path. This loss to the sample for the bias study consisted of 680 students, 4% of the student sample. The frequency with which the 18 paths were selected by students is depicted in Figure 1-1.

Prior to undertaking an analysis of partial response bias a preliminary analysis of partial response was conducted in order to determine the frequency and severity of the problem. Not all of the data collected during the National Longitudinal Study were intended to be used in the analysis of this report; consequently, the data to be used were isolated from the rest, then the number of students who omitted zero, one, two, etc., of the needed items in his path was computed. This was done separately for each of the 18 paths. In all but 5 of the paths the resulting frequency distribution showed strong right skew (which would be expected) and also showed a slight mode in the right tail--a

Figure 1-1

NUMBERS OF STUDENTS FOLLOWING VARIOUS PATHS THROUGH THE STUDENT QUESTIONNAIRE



Note: Each mark "|" represents approximately 150 students.
Fewer than 75 students in a category are not shown.

rather unusual finding. A representative example is shown in Figure 1-2 for path A-B-C-D-H-K. This finding suggests that a small proportion of the sample of respondents may represent a somewhat different kind of student from the rest in that they tend to omit large numbers of items. The numbers of such students were considered to be too small to allow additional analyses and consequently the subsample of students for each valid path were divided into two groups, those who completed every item on their path (full participants) and those who omitted at least one item (partial participants).

From an inspection of Figure 1-1 it can be seen that the frequencies with which students selected various paths differs considerably. Since later analyses would depend upon being able to compare various partitions of the students on a given path, it was decided to omit from the bias analysis any path (and its students) where the number of full or partial participating students was less than 50. This reduced the number of paths from 18 to 11. Those paths not analyzed are given in Table 1-1. All other paths were analyzed.

Table 1-1

Paths Deleted From Bias Analysis

A-B-C-E-H-K.....Students planning apprenticeship or on-the-job training, and to take vocational or technical courses at trade or business school

A-B-C-E-H-J-K.....Students planning apprenticeship or on-the-job training, to take vocational/technical courses at trade or business school, and to work part time

A-B-C-E-I-K.....Students planning apprenticeship or on-the-job training, and to go to college or university

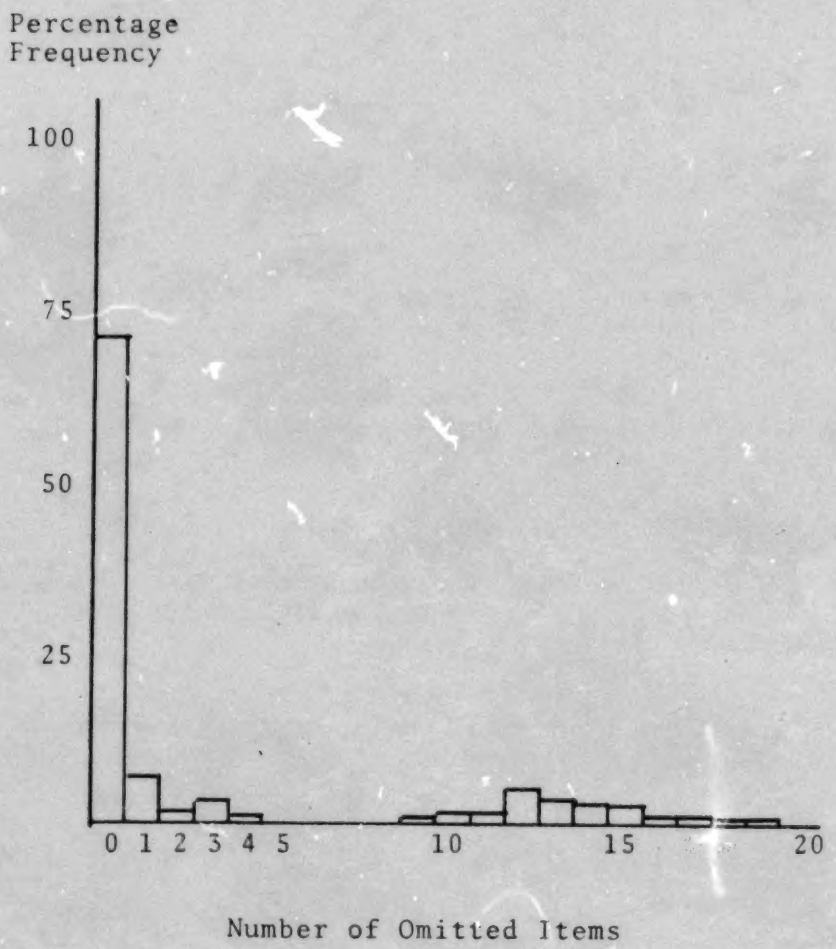
A-B-C-G-H-J-K.....Students planning to be homemakers, to take vocational/technical courses at trade or business school, and to work part time

A-B-C-G-I-K.....Students planning to be homemakers and to go to college or university

A-B-C-J-K.....Students planning to work part time

Figure 1-2

Percentage Frequency Distribution of the Number of Omitted Items for Students on Path A-B-C-D-H-K



The Likelihood of Partial Participation

About one student in five (17%) was a partial participant. This proportion varied, however, according to the student's path. Path A-B-C-K, corresponding to students who had no plans for work, study, training, military, or homemaking for the year after high school, had the highest full participation rate (92%), while the lowest full participation rate (68%) was found in path A-B-C-D-H-J-K for students planning to work and to take vocational or technical courses during the year after high school.

A Chi-square test for equality of the proportion of partial participants was highly significant ($\chi^2_{10} = 221.01$, $p < .001$), indicating that the proportions vary appreciably by path. The data associated with this test are shown in Table 1-2, and indicate that the following paths:

A-B-C-K.....students with no categorizable plans for the next year, and

A-B-C-F-K.....students who were military oriented, and

A-B-C-I-K.....students who were college oriented

had appreciably fewer partial participants than the average, and that paths:

A-B-C-D-H-K
A-B-C-D-H-J-K
A-B-C-H-J-K
} students planning work and voc/tech training activities, and

A-B-C-D-I-K....students planning full time work and college oriented training, and

A-B-C-H-K.....students planning voc/tech training

had appreciably more partial participants than the average.

Curriculum and Partial Participation

The NLS Final Report indicated that nonparticipant students incorporated a slightly higher proportion of students with one or more handicaps than that found among participants. An attempt was made in the current study to effect

Table 1-2

Association Between Path and Tendency Not To Respond

Path	Percent Partial Participants	Path Contribution to Chi-square	S.D. From 17.27%
A-B-C-K	7.76%*	44.45*	-6.70*
A-B-C-D-K	18.49	3.43	1.84
A-B-C-D-H-K	26.52	17.01	4.09
A-B-C-D-H-J-K	32.13	42.36	6.54
A-B-C-D-I-K	29.43	30.17	5.56
A-B-C-E-K	19.05	.44	.75
A-B-C-F-K	12.89	7.63	-2.78
A-B-C-G-K	17.79	.27	.26
A-B-C-H-K	26.50	38.84	6.22
A-B-C-H-J-K	22.05	13.34	3.66
A-B-C-I-K	15.16	23.07	-4.80
Overall	17.27%	χ^2 = 221.01	

*The table is interpreted as follows: 7.76% of students on Path A-B-C-K were partial participants. Under the null hypothesis of similar partial participation rates for all paths, Path A-B-C-K contributes 44.45 to the Chi-square test. The 7.7% rate lies 6.70 standard deviations below the overall rate of 17.27%.

a similar comparison. Unfortunately, the number of handicapped students was too small to admit meaningful analysis.

It was, however, possible to explore the incidence rates of partial participation across the students' curricula, and to do so separately for each of the 11 paths. The analyses were conducted by Chi-square, testing whether the partial participation rate was the same for each of the curriculum subgroups. The degrees of freedom for the Chi-square test varied somewhat from one path to another owing to small subgroup sizes which required subgroups to be combined in the analysis. The results of the analysis are summarized in Table 1-3.

The interpretation of Table 1-3 will be illustrated by considering Path A-B-C-K. Students on this path are those having no categorizeable plans for the year following high school. Forty-four percent of the partial participants on this path were general curriculum students. The "+" sign before the percentage indicates that the proportion of general students who were partial participants exceeds the average rate for the path (8%). Partial participants from the Academic curriculum represented 24% of all partial participants on this path; yet, the proportion of partial participation for academic students (5%--not shown in Table 1-3) was less than the 8% average rate for the path, as indicated by the "-" sign before the percentage. Owing to small subgroup sizes, four curriculum groups were combined for this analysis: agricultural, distributive education, health, and home economics. Collectively, these four subgroups had a higher-than-average partial participation rate. The Chi-square test was conducted with 4 degrees of freedom and obtained a Chi-square value of 10.07, a result which would be considered significant at the .05 level.

Table 1-3

Summary of Partial Participation by Curriculum and Path

(Numbers in Percent of Curriculum Group)

Path	Path Rate	Gen.	Acad.	Agri.	Bus.	D.E.	Health	Home Ec.	Trade	(d.f.)	χ^2
A-B-C-K	8%	+44	-24	+5*	9	+5*	+5*	+5*	17	(4)	10.07 p < .05
A-B-C-D-K	18	+40	-14	2	23	3	+1	2	15	(7)	26.84 p < .001
A-B-C-D-H-K	27	39	16	11*	19	11*	11*	11*	16	(4)	5.63 p < .25
A-B-C-D-H-J-K	32	47	13	9*	17	9*	9*	9*	14	(4)	4.82 p < .35
A-B-C-D-I-K	29	40	34	6*	15	6*	6*	6*	6	(4)	4.22 p < .40
A-B-C-E-K	19	50	17	10*	10*	10*	10*	10*	23	(3)	1.01 p < .80
A-B-C-F-K	13	42	30	12*	12*	12*	12*	12*	17	(3)	2.80 p < .45
A-B-C-G-K	18	43	13	15*	29	15*	15*	15*	15*	(3)	2.17 p < .55
A-B-C-H-K	26	39	-27	+7*	20	+7*	+7*	+7*	7	(4)	15.95 p < .005
A-B-C-H-J-K	22	36	20	2	20	2	3*	3*	17	(6)	6.34 p < .40
A-B-C-I-K	15	+20	-71	--	+5	+1	+1*	+1*	+2	(6)	45.62 p < .001

Notes

* These categories were combined during analysis

\+ The proportion of partial participants in this category was higher than average

\- The proportion of partial participants in this category was lower than average

Four of the 11 paths tested (A-B-C-K, A-B-C-D-K, and A-B-C-H-K, and A-B-C-I-K) produced significant biases, generally of a similar pattern. General students, and students in agriculture, distributive education, health, and home economics tend toward unduly high partial participation rates. Students of academic curricula tend to produce unusually low partial participation rates. The four paths where bias was detected contain students who indicated some combination of the following plans for the year after high school: (a) no plans fitting the categories provided in the student questionnaire, (b) planning to work full time, (c) planning to take vocational or technical courses at a trade or business school, and (d) planning to further their academic education. It is notable that whenever curriculum differences were found they were generally of the same pattern, but that they were not to be found in every path. Moreover, there seemed to be no definite relationship between the presence or absence of a curriculum difference and whether the rate for the path was significant.

SRIF Comparisons of Full and Partial Participants

The final evaluation of partial participation bias effects was conducted by comparing Student School Record Information Form (SRIF) data of full participants with similar data from partial participants. This was accomplished by computing a Student's t-test for the difference between the means of the two groups on each of a series of variables taken from the SRIF. Some of the selected variates did not obtain a significant difference between the two groups on any of the 11 paths considered. These variates have been omitted from the list of variates in Tables 1-4a through 1-4k where the exploration is summarized. Mean differences were computed as (Mean Full Participants minus Mean Partial Participants).

Table 1-4a

Summary of SRIF Comparisons Between Full and Partial Participants

Path A-B-C-K: Students With No Categorizeable Plans

Variable	t	p <	$\omega^2 \times 100$
Class Rank ÷ Enrollment			
Scholastic Aptitude Test (Verbal) ÷ 100	2.64	.01	.8%
Scholastic Aptitude Test (Quant.) ÷ 100	2.62	.01	.8
Semesters of coursework in:			
Sciences			
Foreign Languages	2.22	.05	.6
Social Studies			
English			
Mathematics			
Industrial Arts			
Commerce			
Fine Arts			
Vocational/Technical courses:			
Business			
Distributive Education			
Proportion of students who, within last year, took courses in:			
Science or Mathematics			
Social Studies			
...or were grouped by ability in			
Vocational/Technical course			
Proportion in Remedial Mathematics			
Proportion in Remedial Reading or Lang.			
Proportion handicapped			
Proportion partic. in Coop. Voc. Ed. Pgm.	-2.46	.02	.7
Proportion in High School Work-Study			
Proportion in Neighborhood Youth Corps			

Total Sample Size: 705

Note: t is computed as {mean (Full Participants) minus mean (Partial Participants)}

Table 1-4b

Summary of SRIF Comparisons Between Full and Partial Participants

For Path A-B-C-D-K: Students Planning To Work Full Time

Variable	t	p <	$\omega^2 \times 100$
Class Rank ÷ Enrollment	6.92	.001	1.4%
Scholastic Aptitude Test (Verbal) ÷ 100			
Scholastic Aptitude Test (Quant.) ÷ 100			
Semesters of coursework in:			
Sciences	2.07	.05	.1
Foreign Languages	4.89	.001	.7
Social Studies	-2.30	.03	.1
English			
Mathematics			
Industrial Arts			
Commerce			
Fine Arts			
Vocational/Technical courses:			
Business	2.57	.02	.2
Distributive Education			
Proportion of students who, within last year, took courses in:			
Science or Mathematics			
Social Studies			
...or were grouped by ability in			
Vocational/Technical course			
Proportion in Remedial Mathematics	-2.22	.03	.1
Proportion in Remedial Reading or Lang.	-4.36	.001	.5
Proportion handicapped	-2.84	.01	.2
Proportion partic. in Coop. Voc. Ed. Pgm.			
Proportion in High School Work-Study			
Proportion in Neighborhood Youth Corps			

Total Sample Size: 3280

Note: t is computed as {mean (Full Participants) minus mean (Partial Participants)}

Table 1-4c

Summary of SRIF Comparisons Between Full and Partial Participants

For Path A-B-C-D-H-K: Students Planning Full Time Work and Trade or Business School Courses

Variable	t	p <	$\omega^2 \times 100$
Class Rank ÷ Enrollment			
Scholastic Aptitude Test (Verbal) ÷ 100			
Scholastic Aptitude Test (Quant.) ÷ 100			
Semesters of coursework in:			
Sciences			
Foreign Languages			
Social Studies			
English	2.03	.05	1.1%
Mathematics			
Industrial Arts			
Commerce			
Fine Arts			
Vocational/Technical courses:			
Business			
Distributive Education	2.38	.02	1.6
Proportion of students who, within last year, took courses in:			
Science or Mathematics	2.48	.02	1.8
Social Studies			
...or were grouped by ability in			
Vocational/Technical course			
Proportion in Remedial Mathematics			
Proportion in Remedial Reading or Lang.			
Proportion handicapped			
Proportion partic. in Coop. Voc. Ed. Pgm.			
Proportion in High School Work-Study			
Proportion in Neighborhood Youth Corps			

Total Sample Size: 280

Note: t is computed as {mean (Full Participants) minus mean (Partial Participants)}

Table 1-4d

Summary of SRIF Comparisons Between Full and Partial Participants

For Path A-B-C-D-H-J-K: Students Planning Part- or Full-Time Work and Trade or Business School Courses

Variable	t	p <	$\omega^2 \times 100$
Class Rank ÷ Enrollment			
Scholastic Aptitude Test (Verbal) ÷ 100	2.58	.02	2.0%
Scholastic Aptitude Test (Quant.) ÷ 100	3.31	.01	3.4
Semesters of coursework in:			
Sciences	-2.11	.05	1.2
Foreign Languages			
Social Studies			
English			
Mathematics			
Industrial Arts	3.31	.01	3.4
Commerce			
Fine Arts			
Vocational/Technical courses:			
Business			
Distributive Education			
Proportion of students who, within last year, took courses in:			
Science or Mathematics			
Social Studies			
...or were grouped by ability in			
Vocational/Technical course	2.26	.05	1.4
Proportion in Remedial Mathematics			
Proportion in Remedial Reading or Lang.			
Proportion handicapped			
Proportion partic. in Coop. Voc. Ed. Pgm.			
Proportion in High School Work-Study			
Proportion in Neighborhood Youth Corps			

Total Sample Size: 281

Note: t is computed as {mean (Full Participants) minus mean (Partial Participants)}

Table 1-4e

Summary of SRIF Comparisons Between Full and Partial Participants

For Path A-B-C-D-I-K: Students Planning Full Time Work and to Pursue Academic Education

Variable	t	p <	$\omega^2 \times 100$
Class Rank ÷ Enrollment	2.15	.05	1.2%
Scholastic Aptitude Test (Verbal) ÷ 100			
Scholastic Aptitude Test (Quant.) ÷ 100			
Semesters of coursework in:			
Sciences			
Foreign Languages			
Social Studies			
English			
Mathematics			
Industrial Arts			
Commerce			
Fine Arts			
Vocational/Technical courses:			
Business			
Distributive Education			
Proportion of students who, within last year, took courses in:			
Science or Mathematics			
Social Studies			
...or were grouped by ability in			
Vocational/Technical course			
Proportion in Remedial Mathematics			
Proportion in Remedial Reading or Lang.			
Proportion handicapped			
Proportion partic. in Coop. Voc. Ed. Pgm.			
Proportion in High School Work-Study	2.07	.05	1.1
Proportion in Neighborhood Youth Corps			

Total Sample Size: 297

Note: t is computed as {mean (Full Participants) minus mean (Partial Participants)}

Table 1-4f

Summary of SRIF Comparisons Between Full and Partial Participants
For Path A-B-C-E-K: Students Planning On-The-Job Training
or Apprenticeship Programs

Variable	t	p <	$\omega^2 \times 100$
Class Rank ÷ Enrollment			
Scholastic Aptitude Test (Verbal) ÷ 100			
Scholastic Aptitude Test (Quant.) ÷ 100			
Semesters of coursework in:			
Sciences			
Foreign Languages			
Social Studies			
English			
Mathematics			
Industrial Arts			
Commerce			
Fine Arts			
Vocational/Technical courses:			
Business			
Distributive Education			
Proportion of students who, within last year, took courses in:			
Science or Mathematics			
Social Studies			
...or were grouped by ability in			
Vocational/Technical course			
Proportion in Remedial Mathematics			
Proportion in Remedial Reading or Lang.			
Proportion handicapped			
Proportion partic. in Coop. Voc. Ed. Pgm.			
Proportion in High School Work-Study			
Proportion in Neighborhood Youth Corps			

No Significant Bias Detected

Total Sample Size: 250

Note: t is computed as {mean (Full Participants) minus mean (Partial Participants)}

Table 1-4g

Summary of SRIF Comparisons Between Full and Partial Participants

For Path A-B-C-F-K: Students Planning To Enter Military

Variable	t	p <	ω^2 × 100
Class Rank : Enrollment	2.71	.01	1.1%
Scholastic Aptitude Test (Verbal) : 100			
Scholastic Aptitude Test (Quant.) : 100	2.35	.02	.8
Semesters of coursework in:			
Sciences			
Foreign Languages			
Social Studies	2.29	.05	.7
English			
Mathematics			
Industrial Arts			
Commerce			
Fine Arts	2.33	.05	.8
Vocational/Technical courses:			
Business			
Distributive Education			
Proportion of students who, within last year, took courses in:			
Science or Mathematics	2.50	.02	.9
Social Studies	2.21	.05	.7
...or were grouped by ability in			
Vocational/Technical course	2.71	.01	1.1
Proportion in Remedial Mathematics			
Proportion in Remedial Reading or Lang.			
Proportion handicapped			
Proportion partic. in Coop. Voc. Ed. Pgm.			
Proportion in High School Work-Study			
Proportion in Neighborhood Youth Corps			

Total Sample Size: 575

Note: t is computed as {mean (Full Participants) minus mean (Partial Participants)}

Table 1-4h

Summary of SRIF Comparisons Between Full and Partial Participants

For Path A-B-C-G-K: Students Planning To Be Homemakers

Variable	t	$p <$	$\omega^2 \times 100$
Class Rank ÷ Enrollment	2.38	.02	1.2%
Scholastic Aptitude Test (Verbal) ÷ 100			
Scholastic Aptitude Test (Quant.) ÷ 100			
Semesters of coursework in:			
Sciences			
Foreign Languages			
Social Studies			
English			
Mathematics	2.48	.02	1.2
Industrial Arts			
Commerce	2.39	.02	1.2
Fine Arts			
Vocational/Technical courses:			
Business	3.35	.01	2.6
Distributive Education			
Proportion of students who, within last year, took courses in:			
Science or Mathematics			
Social Studies			
...or were grouped by ability in			
Vocational/Technical course			
Proportion in Remedial Mathematics			
Proportion in Remedial Reading or Lang.			
Proportion handicapped			
Proportion partic. in Coop. Voc. Ed. Pgm.			
Proportion in High School Work-Study			
Proportion in Neighborhood Youth Corps	3.35	.01	2.6

Total Sample Size: 387

Note: t is computed as {mean (Full Participants) minus mean (Partial Participants)}

Table 1-4i

Summary of SRIF Comparisons Between Full and Partial Participants

For Path A-B-C-H-K: Students Planning Trade or Business School Courses

Variable	t	p <	$\omega^2 \times 100$
Class Rank ÷ Enrollment			
Scholastic Aptitude Test (Verbal) ÷ 100			
Scholastic Aptitude Test (Quant.) ÷ 100			
Semesters of coursework in:			
Sciences			
Foreign Languages			
Social Studies			
English			
Mathematics			
Industrial Arts			
Commerce			
Fine Arts	4.70	.01	3.1%
Vocational/Technical courses:			
Business			
Distributive Education			
Proportion of students who, within last year, took courses in:			
Science or Mathematics			
Social Studies			
...or were grouped by ability in			
Vocational/Technical course			
Proportion in Remedial Mathematics	-2.00	.05	.5
Proportion in Remedial Reading or Lang.			
Proportion handicapped	-2.34	.02	.7
Proportion partic. in Coop. Voc. Ed. Pgm.			
Proportion in High School Work-Study			
Proportion in Neighborhood Youth Corps			
Proportion Participation in Upward Bound	2.09	.05	.5

Total Sample Size: 652

Note: t is computed as {mean (Full Participants) minus mean (Partial Participants)}

Table 1-4j

Summary of SRIF Comparisons Between Full and Partial Participants

For Path A-B-C-H-J-K: Students Planning Part-Time Work and Trade or Business School Courses

Variable	t	p <	$\omega^2 \times 100$
Class Rank ÷ Enrollment			
Scholastic Aptitude Test (Verbal) ÷ 100			
Scholastic Aptitude Test (Quant.) ÷ 100			
Semesters of coursework in:			
Sciences			
Foreign Languages			
Social Studies			
English			
Mathematics			
Industrial Arts			
Commerce			
Fine Arts			
Vocational/Technical courses:			
Business			
Distributive Education			
Proportion of students who, within last year, took courses in:			
Science or Mathematics			
Social Studies			
...or were grouped by ability in Vocational/Technical course			
Proportion in Remedial Mathematics			
Proportion in Remedial Reading or Lang.			
Proportion handicapped			
Proportion partic. in Coop. Voc. Ed. Pgm.			
Proportion in High School Work-Study			
Proportion in Neighborhood Youth Corps			

No Significant Bias Detected

Total Sample Size:

Note: t is computed as {mean (Full Participants) minus mean (Partial Participants)}

Table 1-4k

Summary of SRIF Comparisons Between Full and Partial Participants For Path A-B-C-I-K: Students Planning To Pursue Academic Education

Variable	t	p <	ω^2 x 100
Class Rank ÷ Enrollment	7.42	.001	.7%
Scholastic Aptitude Test (Verbal) ÷ 100	3.37	.001	.1
Scholastic Aptitude Test (Quant.) ÷ 100	3.28	.01	.1
Semesters of coursework in:			
Sciences	5.21	.001	.4
Foreign Languages			
Social Studies	2.37	.02	.1
English			
Mathematics	5.50	.001	.4
Industrial Arts	-2.13	.04	.0
Commerce			
Fine Arts			
Vocational/Technical courses:			
Business	-2.07	.04	.0
Distributive Education	-3.83	.001	.2
Proportion of students who, within last year, took courses in:			
Science or Mathematics	2.82	.01	.1
Social Studies			
...or were grouped by ability in			
Vocational/Technical course			
Proportion in Remedial Mathematics	-2.04	.05	.0
Proportion in Remedial Reading or Lang.	-2.80	.01	.1
Proportion handicapped			
Proportion partic. in Coop. Voc. Ed. Pgm.			
Proportion in High School Work-Study	-2.48	.02	.1
Proportion in Neighborhood Youth Corps	-2.88	.01	.1

Total Sample Size: 7377

Note: t is computed as {mean (Full Participants) minus mean (Partial Participants)}

Degrees of freedom for the t-tests vary from 248 (Path A-B-C-E-K) to 7,375 (Path A-B-C-I-K) so that for all practical purposes the tests might be considered to be large-sample tests conducted through the normal distribution rather than the Student's t-distribution.

There are two cautions which should be applied to the interpretation of the data in Tables 1-4a through 1-4k. First is the fact that the procedure used would produce one or more asterisks on the table about 5% of the time even if no true difference existed between the full and partial participants. Since 374 individual tests were conducted we might expect about 19 specious results even if there were no true differences to be found. A t-value of 3 or greater should be encountered only about 1% of the time by chance alone, however, so that interpretation only of such situations is less likely to be misleading than is interpretation of all values presented. Absolute t-values less than 2 are not reported.

The second consideration lies in the very large numbers of cases, or observations, which made up the tests in some of the paths. Path A-B-C-I-K, for example, contains 7,377 students. Under such conditions the t-test is exceedingly sensitive, and is capable of detecting very minute differences. Thus we may anticipate some findings of "statistically significant bias," while the actual amount of bias involved, and its importance to the study, is virtually negligible. Table 1-5 displays the means observed for the 22 variables in the case of Path A-B-C-I-K in demonstration of the magnitudes of differences observed. Additionally, w^2 (omega squared) values, multiplied by 100, have been tabled beside each entry in Tables 1-4. These values reflect the magnitudes of difference in terms of the present of variance reduction which occurs as a result of knowledge of the "treatment"--i.e., the group to which a student belongs (2).

Table 1-5

Means for Significant Variables on Path A-B-C-I-K
(Students Planning Additional Academic Training)

Variate†	Full Participants	Partial Participants	Mean Difference
Rank ÷ Enrollment	.65	.58	.07***
SAT-V (÷100)	4.74	4.54	.20**
SAT-Q (÷100)	5.07	4.88	.19**
Science	4.26	3.92	.34***
Social Studies	5.47	5.34	.13*
Mathematics	4.65	4.30	.35***
Industrial Arts	1.49	1.74	-.25*
Business	2.64	2.90	-.26*
Distributive Education	.20	.45	-.25**
Took Science	.67	.62	.05*
Remedial Mathematics	.03	.04	-.01*
Remedial Reading	.03	.05	-.02*
Work Study	.02	.04	-.02*
Youth Corps	.02	.03	-.01*

* $2 \leq t < 3$, $.003 < p \leq .046$

** $3 \leq t < 4$, $.000 < p \leq .003$

*** $4 \leq t$, $p \leq .000$

† Variate names are those of Table 1-4k with non-significant variates omitted.

Tables 1-4 show a number of significant differences, and no common pattern seems readily to present itself. Paths A-B-C-E-K and A-B-C-H-J-K (students planning to enter an apprenticeship or on-the-job training, and students planning to attend a trade or business school and to work part time) did not produce significant bias on any of the variables examined.

All other paths did produce significant biases, generally of small magnitude. A summary of these results is presented below:

Path A-B-C-K (Students with no categorizeable plans)

Full participants were higher than partial participants on

SAT Verbal and Quantitative scores,

No. of semesters of foreign language studied,

and lower than partial participants on

the proportion involved in High School Cooperative Education.

Path A-B-C-D-K (Students planning to work full time)

Full participants were higher than partial participants on

class standing (rank : enrollment),

No. of semesters of science studied,

No. of semesters of foreign languages studied,

No. of semesters of business courses studied,

and lower than partial participants on

No. semesters of social studies taken,

Incidence of remedial math and remedial reading,

and incidence of handicapped students.

Path A-B-C-D-H-K (Students planning to work full time and to take trade or business school courses)

Full participants were higher than partial participants on

No. semesters of English studied,

No. of distributive education courses studied, and

incidence of having taken Science courses.

Path A-B-C-D-H-J-K (Students planning to work full or part time and to take trade or business school courses)

Full participants were higher than partial participants on

SAT Verbal and Quantitative scores,

No. semesters of Industrial Arts courses taken, and

incidence of ability-tracked voc/tech courses,

but lower than partial participants in number of semesters of Science courses taken.

Path A-B-C-D-I-K (Students planning to work full time and to pursue academic education)

Full participants were higher than partial participants on

class standing (rank ÷ enrollment), and

incidence of Work Study program students.

Path A-B-C-E-K (Students planning to enter on-the-job training or apprenticeship programs) produced no detectable bias effects.

Path A-B-C-F-K (Students planning to enter the military)

Full participants were higher than partial participants on

class standing,

SAT Quantitative score,

No. of semesters of Social Studies taken,

No. of semesters of Fine Arts taken,

incidence of students taking Science courses,

incidence of students taking Social Studies courses, and

incidence of students in ability-grouped voc/tech courses.

Path A-B-C-G-K (Students planning to be homemakers)

Full participants were higher than partial participants on

class standing,

No. of semesters of Mathematics courses taken,

No. of semesters of Commerce courses taken,

No. of semesters of Business courses taken, and

incidence of Neighborhood Youth Corps students.

Path A-B-C-H-K (Students planning to take courses at a trade or business school)

Full participants were higher than partial participants on the number of semesters of Fine Arts courses taken.

Path A-B-C-H-J-K (Students planning to work part time and to take courses at a trade or business school)

(No bias effects were detected.)

Path A-B-C-I-K (Students planning to further their academic education)

Full participants were higher than partial participants on

class standing,

SAT-Verbal and Quantitative scores,

No. semesters of Science, Social Studies, and Mathematics courses taken,

incidence of Science courses taken in past year,

and lower than partial participants on

No. semesters of Industrial Arts courses taken,

No. semesters of Business courses taken,

No. semesters of Distributive Education taken,

incidence of remedial math and reading students, and

incidence of Work Study and Neighborhood Youth Corps students.

SUMMARY

Nonresponse bias effects, i.e., the bias introduced into the data by schools and students that did not participate in the original National Longitudinal Study, were previously reported in the Final Report of that project. The bias introduced by nonresponse was considered to be slight but systematic. The non-participating school tended to be small, enrolling fewer than 300 seniors, and was often located in the South, often in rural areas. Students in participating schools who, despite the cooperation of their school, nonetheless declined to participate, tended to be less academically oriented, more mobile, and more likely to have one or more learning disabilities than students who participated.

A different form of nonresponse bias was explored in this report; specifically, the bias introduced by students who participated, but did so incompletely by not answering all the questions put to them. Such students were called "partial participants" while those who answered all necessary questions were termed "full participants."

Eleven of the 18 proper paths through the questionnaire were considered to have adequate sample sizes to allow partial participation bias effects to be examined. There were appreciable differences, among the 11 paths, in the proportion of students who were partial participants. Students having no categorizeable plans for the year following high school had the highest rate of <u>full</u> participation (92%), while students planning to work and to take vocational or technical courses during the next year had the lowest full participation rate (68%). Academically-oriented students had an 85% full participation rate.

The curricula of the students in each of the 11 questionnaire paths were also examined for a relationship with partial participation effects. Biases were detected in four of the 11 paths. General students, students in agriculture, distribution education, health, and home economics tended to produce low rates of full participation, while the converse was true for academically oriented students.

Variables from the School Record Information Form were evaluated for the 11 paths also, comparing full and partial participants. Significant biases were detected in nine of the paths. No simple pattern of bias was observable; however, it can be observed that for more than half of the sample full participants stood appreciably higher in their class than partial participants, and had higher Scholastic Aptitude Test scores (both Verbal and Quantitative). Enrollment in academically oriented courses tends better to characterize the full participant than the partial participant, while enrollment in vocational or technical courses tends better to characterize the partial participant. Incidence of instructive remediation and physical handicap is also more frequently observed among partial participants.

The kind of bias induced through partial participation may be seen as similar to that induced through nonresponse. It should be recognized, however, that the sample sizes of the current study are large enough to detect even very small bias effects. An examination of the amount of partial participation bias suggests that it is generally small.

Users and interpreters of National Longitudinal Study data should be cautioned that, since the directions of biases from nonresponse and partial participation are similar, their effect will be additive upon the sample, not compensatory. Accordingly, the presence of bias effects should not be ignored.

Notes

1. National Longitudinal Study, Final Report, pp. 4-67 through 4-73.

2. An elementary exposition of this statistic may be found in Hays, William L., Statistics for Psychologists, Holt, Rinehart, and Winston, New York, 1963 (Printed 1965), pp. 323-332.

CHAPTER 2

MINORITY COMPOSITION OF THE SENIOR CLASS IN 1972

Students sampled in the National Longitudinal Study were asked to indicate their racial/ethnic group membership in Item 84 of the Student Questionnaire (Figure 2-1).

Figure 2-1

Student Questionnaire

Item 84

84. How do you describe yourself?

(Circle one.)

American Indian	1
Black or Afro-American or Negro	2
Mexican-American or Chicano	3
Puerto Rican	4
Other Latin-American origin	5
Oriental or Asian-American	6
White or Caucasian	7
Other	8

By administering the same item to parents of a subsample of students it was possible to check the validity of responses to this item. Results indicated that parents and students checked the same alternative about 92% of the time. Moreover, the racial/ethnic composition of subsample data

produced by parents was very similar to that produced by corresponding students and both were similar in composition to the whole sample.

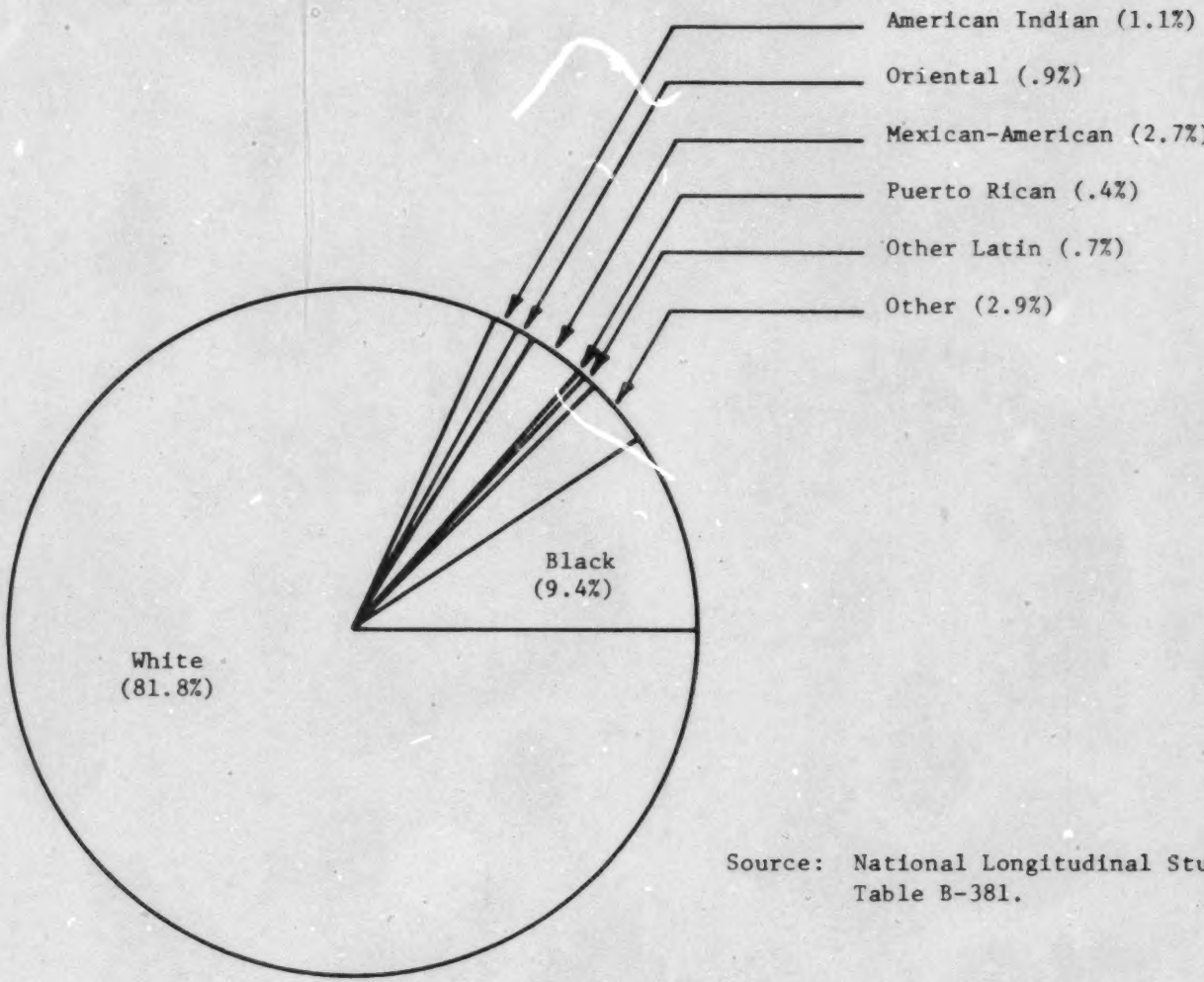
Apart from Blacks and Whites the subsample sizes are too small to admit extensive analyses, so that the development to follow will be limited to two fundamental discussions: first, the composition of the high school class of 1972 by racial/ethnic classification and, second, the composition of Blacks and Whites by sex and curriculum.

About one student in 11 did not respond to the racial/ethnic question. While nonresponse bias effects have been detected and measured in this study, they shed little light upon the racial/ethnic grouping of nonrespondents. The potential problem presented by these facts is made visible when one understands that the proportion of persons who did not respond is greater than the proportion of known Blacks in the sample. Thus, the nonresponse bias effect could conceivably modify all but the most powerful effects. The direction of nonresponse bias would generally suggest that minority group members might be less likely to respond than would Whites, but there would undoubtedly be respondents and nonrespondents from all racial/ethnic groupings. Since we are unable to adjust the data to mitigate these problems, we must set aside the 274,000 students who, in the population, would likely not have answered the question and confine our attention to the 2,679,000 who would likely have responded.

The racial/ethnic composition of the high school class of 1972 is summarized in Figure 2-2. Whites comprise more than three-quarters of the senior class, and there are about as many Blacks as there are members of all other minority groups combined. About 11-1/2% of the general American population is Black. Nonresponse bias and school dropouts are likely causes of the lower minority figures reported here.

Figure 2-2

Percentage Composition of High School Seniors in 1972
By Racial/Ethnic Group



Source: National Longitudinal Study, Appendix B-2, Table B-381.

If we confine our attention to Blacks and Whites, we may increase the depth of our exploration to incorporate sex and curriculum. The 2,427,000 Black and White students in the population may be allocated to sex and curriculum in approximately the percentages shown in Table 2-1. Thus, discounting the smaller minorities, we should find that about 45% of the population would be White males, and that 21% or 22% of all students would be Whites enrolled in Academic curricula. The data suggest there are about 1,205,000 males and 1,222,000 females in the senior high school population, which reflects a slight (17,000 or .7%) surplus of females.

A better view of the relationships among these percentages may be obtained by allocating students to sex and curriculum separately for the two races. This has been done in Table 2-2. Here we find that 48% of White students are in Academic curricula, as compared to only 27% of the Blacks. While the Academic curriculum is the most likely one for a White student, the General program is most likely for a Black. Proportions of Whites and Blacks in Vocational/Technical curricula are approximately equal--about 26%. Data for Black students indicate appreciably fewer Black males than females. The estimated number of White males exceeds the number of White females by about 8,000 so that the 17,000 male deficit noted earlier actually represents a near 26,000 deficit of Black males compared to Black females. The most likely cause of this difference is the relatively high dropout rate of Black males, but nonresponse bias may vitiate the result. Related is the fact that the percentage of Black females in Academic curricula is 25%, equivalent to that of White males and females. Black males, however, have an incidence in Academic curricula which amounts only to 12%--half that of Black females.

Table 2-1

Percentage Composition of 1972 Seniors
By Race, Sex, and Curriculum

	White (90%)		Black (10%)	
	Male (45%)	Female (45%)	Male (5%)	Female (6%)
General (30%)	14%	12%	2%	2%
Academic (46%)	22%	21%	1%	2%
Voc.-Tech. (24%)	9%	12%	1%	2%

Source: National Longitudinal Study, Appendix B-II, Table B-381.

Note: Cell and marginal figures may not agree owing to rounding errors.

Table

Percentage Composition of 1972 Seniors
By Sex and Curriculum Within Race

	White			Black		
	Male	Female		Male	Female	
General	16%	12%	29%	21%	23%	44%
Academic	24%	24%	48%	12%	25%	27%
Voc.-Tech.	10%	14%	24%	12%	17%	29%
Totals	50%	50%	100%	45%	55%	100%

Source: National Longitudinal Study, Appendix B-II, Table B-381.

Note: Cell and marginal figures may not agree owing to rounding errors.

CHAPTER 3

ABILITY AND ACHIEVEMENT

INTRODUCTION

Ability and achievement are defined operationally in this study through the medium of tests and other measures which were administered to seniors of the high school class of 1972. Ability is usually defined in a sense which incorporates the capability of the person to do things. Achievement tends more to be concerned with what the person does. A student may have a large capability (ability) but allow it to languish so as to do little or nothing. Thus we have the concept of an underachiever who does not perform up to his ability, and that of an overachiever who performs beyond what we should expect. Neither ability nor achievement, however, have been well defined, so that we shall here define both concepts in terms of simple measures which have relevance in an educational setting.

These measures are to be found in the Student Test Battery (STB) which was administered to students in the National Longitudinal Study. The STB consisted of 6 sections, or tests, as follows (1).

1. Vocabulary: Reliability .784, duration 5 minutes, 15 items asking student to select the word or phrase whose meaning was closest to that of a given word.
2. Picture-Number: Reliability .845, two parts of the test have total duration of 10 minutes, total of 30 items with drawings of common objects paired with two digit numbers. Student required to study the pairs, then to recall the proper number when presented a drawing. A test of short term associative memory.

3. Reading: Reliability .797, duration 15 minutes, 15 items. Student presented a passage to read, then to answer multiple choice items related to information stated or implied in the passage. Five reading passages in the test.

4. Letter Groups: Reliability .861, duration 15 minutes, 25 items in which student was presented five groups of four letters each. Four of the groups possessed a common attribute. Student to identify the single group not possessing the attribute.

5. Mathematics: Reliability .866, duration 15 minutes, 25 "data sufficiency" items each consisting of two problems which are (or which might not be) determinate as to quantity. Student required to determine which quantity is greater, or whether the quantities are the same, or whether some quantity is indeterminate.

6. Mosaic Comparisons: Reliability approx. .90, total duration 9 minutes for 3 parts, 116 items total. Each item consisted of two squares, each of which was divided into an equal number of rows and columns to produce 9, 16, or 25 smaller squares within each larger square. Each smaller square was divided on the diagonal and blackened either above or below the diagonal. Depending upon which of two diagonals was chosen, four different shaded smaller squares were possible. The pattern produced by the 9, 16, or 25 shaded squares which comprised the larger square was termed a mosaic. The two mosaics presented in each item were identical excepting one smaller square. The student required to identify the column containing the different square. A speeded test of visual pattern discrimination.

Two additional measures are useful in addition to those of the STB. The first is the student's centile class rank which was computable from data gathered in the SRIF. The second is a derived composite measure (factor score) resulting from a factor analysis of the STB together with centile class rank and the students self-reported grade. The composite measure was termed "student ability" and had an internal consistency index (similar to Cronback's coefficient alpha) of .87.

Probably the best ability measures available are the vocabulary test score, the ability composite, and perhaps the mathematics test score. The best achievement measure is undoubtedly the centile class rank. The distinction between ability and achievement is not clearly set forth by these measures, however, so that the development which follows will be presented in terms of performance on particular tests, avoiding undue emphasis on ability and achievement.

A large number of figures were drawn, ogives of the cumulative percentage frequency distributions of the tests and measures in order to compactly present the results in an informative way. The figures are collected at the end of the chapter. Test results are presented scaled as in the original, i.e., as T-scores (raw scores re-scaled to mean = 50 and standard deviation = 10).

THE CURRICULUM DESIGNATION

Throughout this report we refer to students who have been classified into one of the three curricula--General, Academic, and Vocational-Technical. Since this classification is somewhat less than perfect it will here be indicated how the classification was obtained.

In the National Longitudinal Study there were two sources for obtaining a student's curriculum. The first is the School Record Information Form (SRIF) which was completed from school records by a staffmember of the school. A

separate SRIF was completed for each student in the Study. Item 7 of the SRIF classified the student as belonging to the General, Academic, or one of six types of Vocational-Technical curricula. The second source was Item 2 of the Student Questionnaire which asked for exactly the same information, this time to be provided by the student.

It occasionally happened, of course, that one or the other source of information would be lacking. In that event, the classification would be taken from the source available. Occasionally, also, both sources were lacking so that a student could not be classified. Most of the time both sources were available but even then they sometimes disagreed. In that event the SRIF datum was taken as the preferred information.

Such disagreements between the schools' classifications of students and the students' classifications of themselves were most often found in the Vocational-Technical classification. Twenty-five percent of the Voc.-Tech. (according to the SRIF) students classified themselves as General students and 8% classified themselves as Academic. There were corresponding 13% and 16% reductions in the members of these students who classified themselves into the Business and Trade subclassifications of the Voc.-Tech. classification. The second largest disagreements were found in the 11% of Black students who were SRIF-classified as General students, but who classified themselves in other categories--6% of them into Academic. Other discrepancies were noted, but involved relatively small percentages of students.

Basically, the, the decision was made to use the SRIF designation of a student's curriculum where possible. A check of the reliability of the SRIF item was made available through a SRIF gathered independently by site visitors

who visited a randomly designated group of 50 school districts. The results of these visits indicated agreement between the two SRIFs in about 77% of all cases. Disagreements accounted for about 15% of all cases and missing data for the rest.

VOCABULARY

The cumulative distributions of the scaled vocabulary scores for males and females are shown in Figure 3-1, those for the three curricula in Figure 3-2, and for Blacks and Whites in Figure 3-1. No appreciable difference can be noted between the results for males and females.

The Academic students (median of 56 points) scored appreciably higher than students in other curricula (median of approx. 47 points), and one observes that little difference can be found between the vocabulary scores of General and Voc.-Tech. students. The difference between means of Academic students and others is about one full standard deviation.

A similar deviation can be observed in the difference between the means of Blacks and Whites.

PICTURE-NUMBER

The short-term retention test of picture-number association is presented in Figure 3-4, 3-5, and 3-6 by sex, curriculum, and race, respectively. Females show a slight but significant advantage relative to males. The distributional qualities of male and female data are quite similar, except that females are located about 3 points higher than males.

There was no difference in the performances of General and Voc.-Tech. students on this test, but Academic students show an appreciable advantage

over the other two. The difference between the medians is about 6 points--about .6 standard deviations.

The difference between medians of Blacks and Whites is of similar magnitude--about .8 standard deviations.

READING

The scaled reading test scores are displayed in Figure 3-7, 3-8, and 3-9 by sex, curriculum, and race, respectively. There is virtually no difference between males and females except for a slight tendency for the male frequency distribution to have a few more observations in the tails of the distribution between the second and third standard deviations in each direction.

The data for curricula indicate a pronouncedly superior performance on the part of Academic students, compared to others, and very little difference in the reading scores of General and Voc.-Tech. students. Such differences as may be found between the two groups lies in the slightly more platykurtic distribution of Voc.-Tech. students compared to General students. The difference between medians of Academic and others is about 10 points--a full standard deviation.

The Black-White data demonstrate a superior performance by Whites, with a 10 point difference in the means (11 points in the medians)--a full standard deviation.

LETTER GROUPS

The letter groups test exhibits a strong left skew for the whole sample, and for each of the subgroups studied. Figures 3-10, 3-11, and 3-12 reflect this for the sexes, curriculum group, and races, respectively. Females en-

joyed a very slight performance advantage over males, largely due to slightly fewer females scoring in the lower end of the scale.

The General and Voc.-Tech. results were virtually identical and appreciably lower than the results produced by Academic students. At the median the difference between Academic and other students amounts to about 2/3 of a standard deviation.

Blacks scored appreciably lower than Whites (a full standard deviation lower at the median) and their distribution tended to be slightly more platykurtic than Whites, being nearly a uniform distribution from the 10th to the 90th centiles.

MATHEMATICS

The scaled mathematics test scores are shown by sex, curriculum, and race in Figures 3-13, 3-14, and 3-15, respectively. Males performed appreciably better than females on this test. The difference at the median is only about 3 points, however, so that the difference, while statistically significant, is not great.

Curriculum differences are strongly pronounced, with Academic students about one standard deviation above General students. Vocational-Technical students scored below General students, but only by about 1 1/2 points at the median.

The Black-White difference is appreciable--Whites outscoring Blacks by about 1.2 standard deviations at the median.

MOSAIC COMPARISONS

The results of the mosaic comparisons test are displayed by sex, curriculum, and race in Figures 3-16, 3-17, and 3-18, respectively. The distribution of

mosaic comparisons scores is roughly rectangular and symmetric. The scores of females are slightly higher on the average than those of males.

Differences between General and Voc.-Tech. students are negligible, and located about .4 standard deviations below the scores of Academic students.

Black-White differences are quite appreciable, Blacks scoring about a standard deviation below Whites.

COMPOSITE ABILITY

The composite ability measure is displayed in Figures 3-19, 3-20, and 3-21 by sex, curriculum, and race, respectively. The scores of females average about .2 standard deviations above those of males, but are otherwise quite similar.

The measured ability of Academic students is about one standard deviation above that of other students, and there is no appreciable difference in the ability scores of General and Voc.-Tech. students.

Blacks score about a standard deviation below Whites.

CENTILE CLASS RANK

The distribution of centile class rank is displayed in Figures 3-22, 3-23, and 3-24 for sex, curriculum, and race, respectively. This statistic is computed as:

$$\left(1 - \frac{\text{class rank}}{\text{class enrollment}}\right) \times 100,$$

hence the maximum value of 100 represents the student who stands at the top of his class. The statistic is not corrected for continuity so that some inappropriateness will occur in very small schools. The overall impact of this problem should be slight.

It can be seen in Figure 3-22 that females stand appreciably higher in their classes than males. The median difference is 17%.

The Academic student stands quite a bit higher in his class than do Voc.-Tech. students, but Voc.-Tech. students stand appreciably higher than General students. To the extent that the Student Test Battery and Ability composites can be considered ability measures, and that the centile class rank can be considered an achievement measure it would appear that Voc.-Tech. students tend to be overachievers compared to General students.

Black students lag appreciably behind Whites in class rank. The median difference is about 12%.

SUMMARY

Each test in the Student Test Battery was examined by three comparative analyses: (a) comparing males and females, (b) comparing General, Academic, and Vocational-Technical students, and (c) comparing Blacks and Whites. Similar evaluations were conducted using a composite measure of ability and centile class rank.

The results of these explorations were highly uniform across the various tests and measures. The general pattern of findings was as follows: (a) females performed slightly better than males; (b) there was little difference in the performances of General and Voc.-Tech. students, but Academic students outperformed both other groups; and (c) Blacks scored appreciably lower than Whites--about one standard deviation lower.

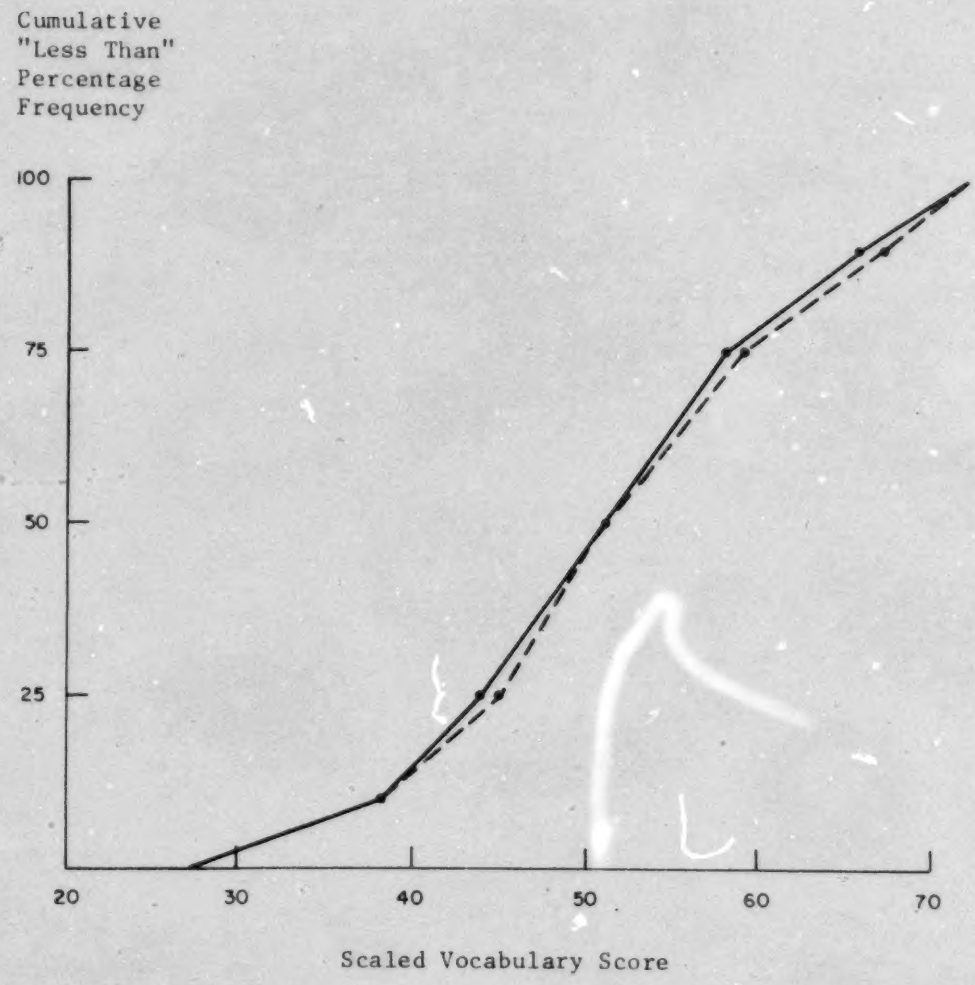
Exceptions to this pattern were few. Males and females were essentially equal in vocabulary and reading but males outperformed females on the mathematics

test. The advantage of females compared to males in class standing was appreciable--the median female stood 17% higher in the class than the median male.

Comparisons of Vocational and General students provided only two exceptions to the pattern. Vocational students scored very slightly lower in mathematics than General students, but stand about 6% higher in their class than General students. There were no exceptions to the rule that Academic students scored appreciably higher on all tests and measures than did other students, nor were there exceptions to the rule that Blacks scored appreciably lower than Whites.

Figure 3-1

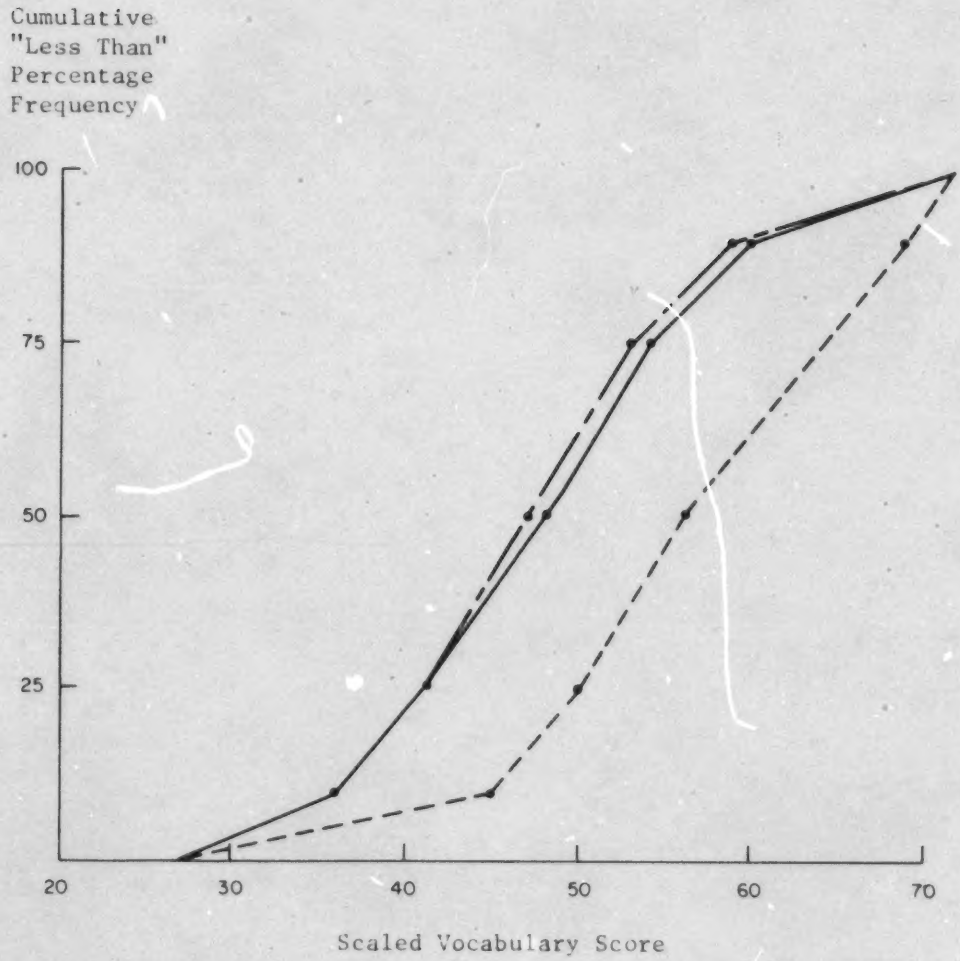
Vocabulary Scores for Males and Females



Source: National Longitudinal Study, Appendix D, Table D-282, pp. D-591 and D-592

Figure 3-2

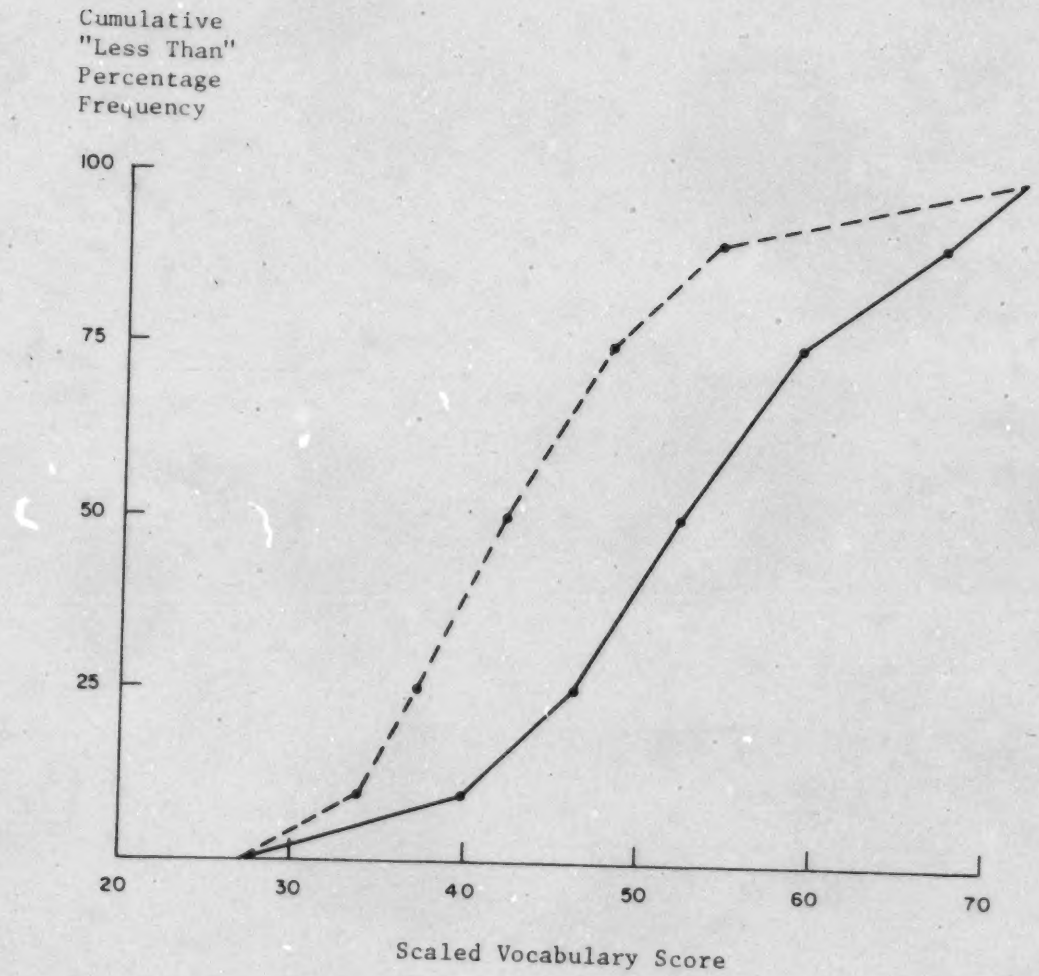
Vocabulary Scores, by Curriculum



Source: National Longitudinal Study, Appendix D, Table D-282, pp. D-591 and D-592.

Figure 3-3

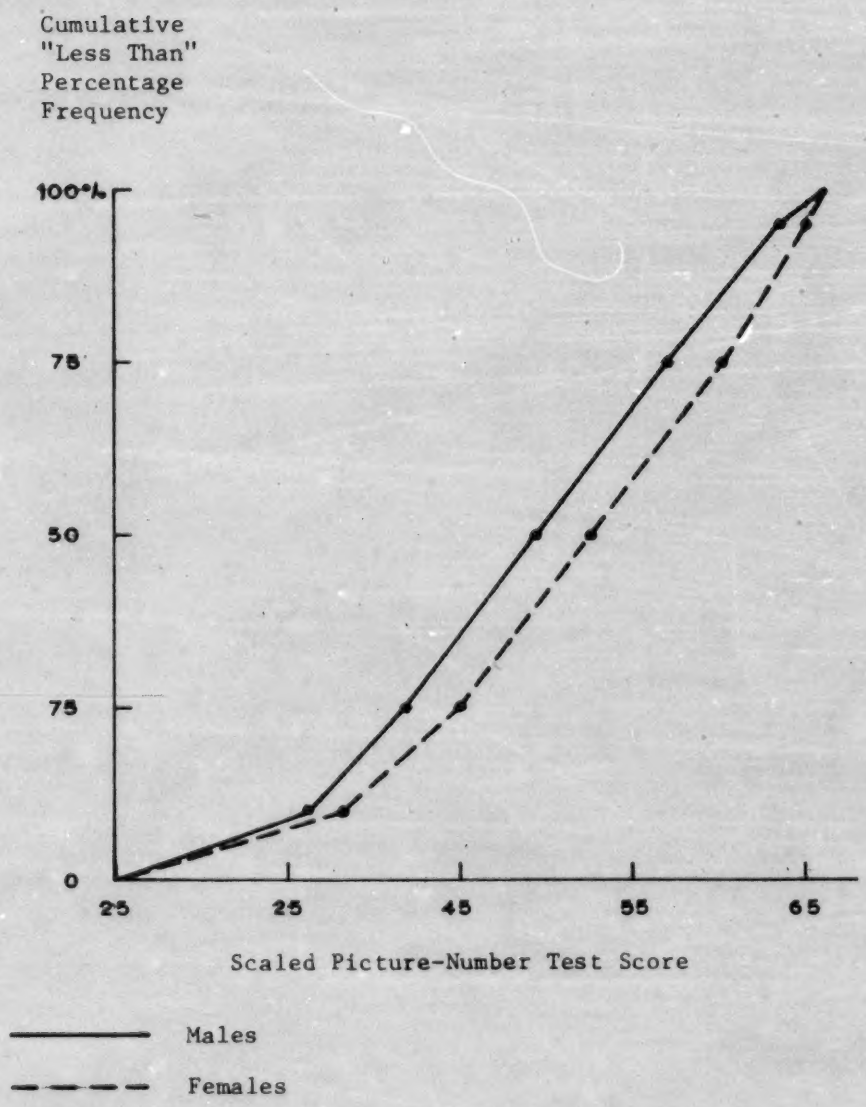
Vocabulary Scores, by Race



Source: National Longitudinal Study, Appendix D, Table D-282, pp. D-591 and D-592.

Figure 3-4

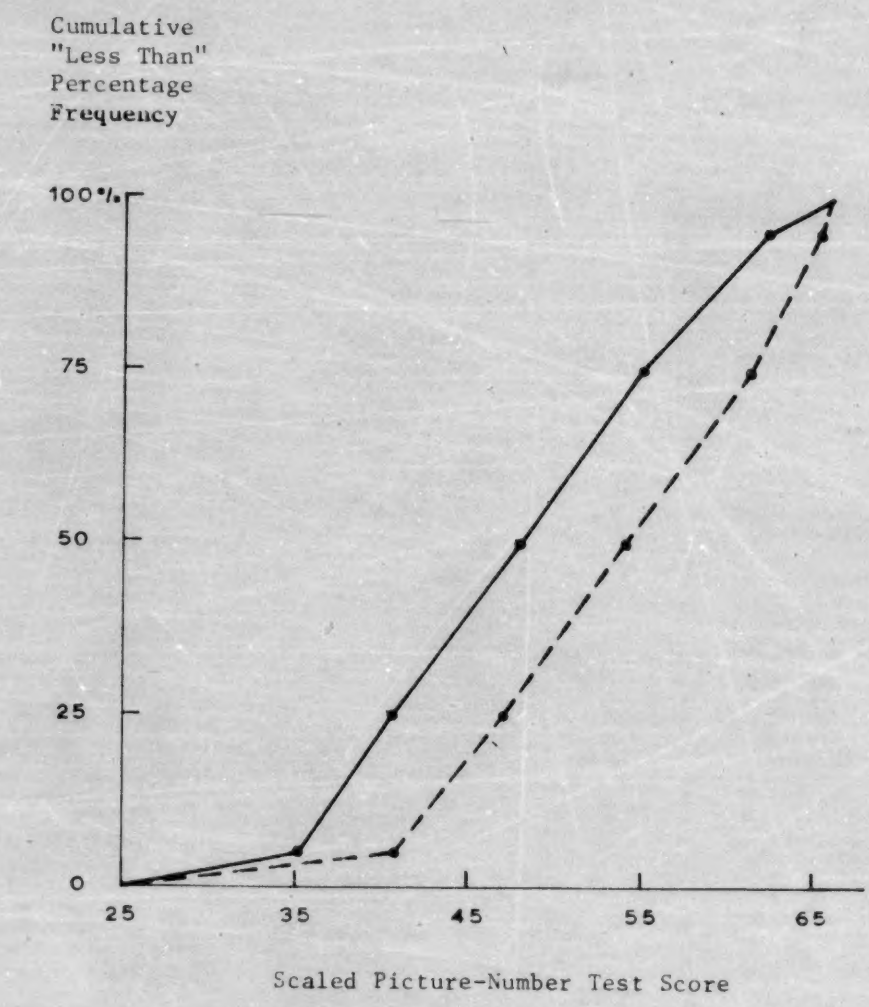
Picture-Number Test, by Sex



Source: National Longitudinal Study, Appendix D, Table D-285, pp. D-597 and D-598.

Figure 3-5

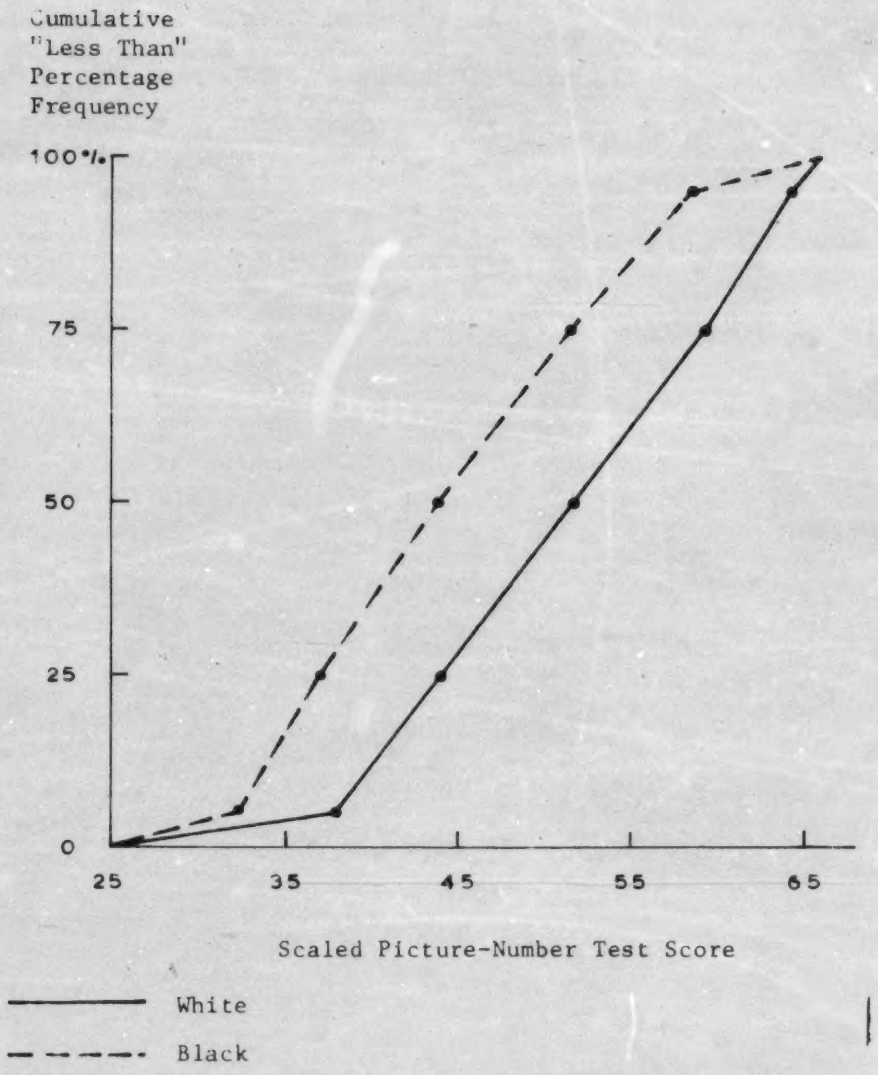
Picture-Number Test, by Curriculum



Source: National Longitudinal Study, Appendix D, Table D-285, pp. D-597 and D-598.

Figure 3-6

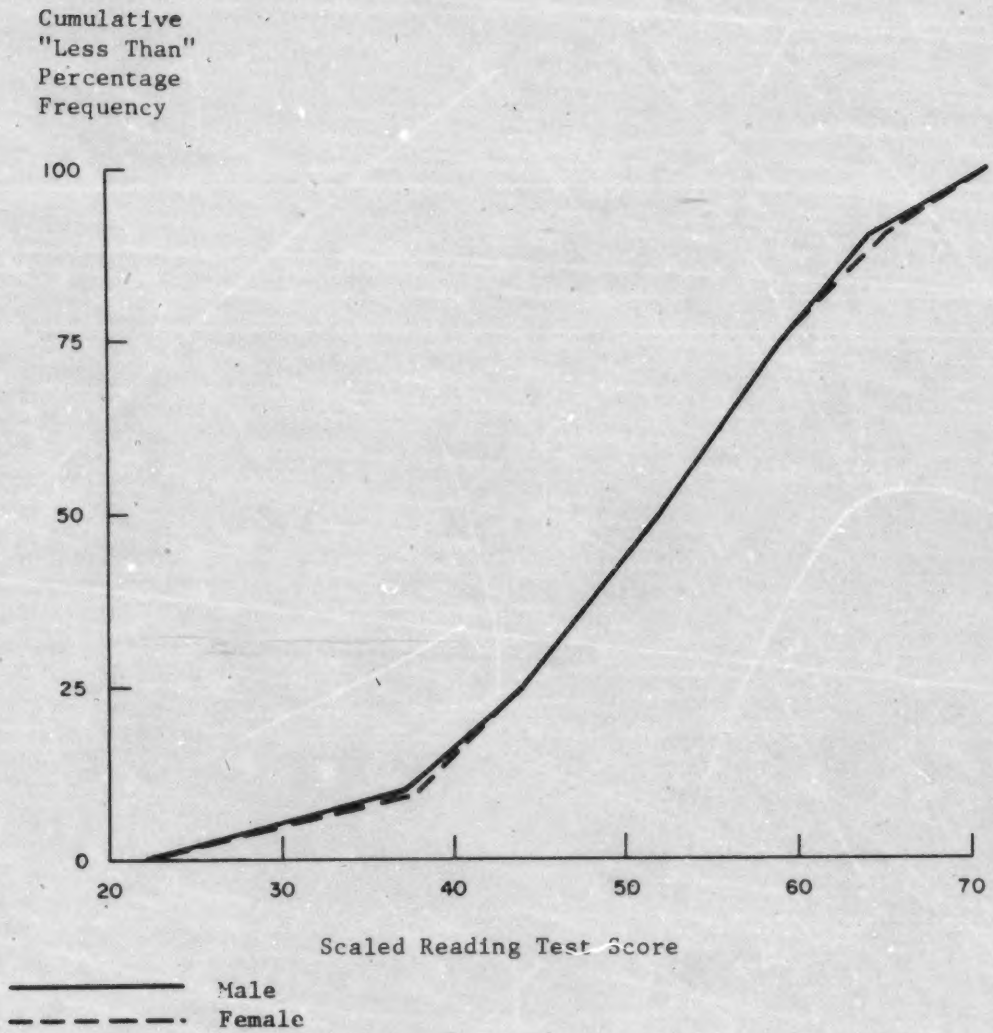
Picture-Number Test, by Race



Source: National Longitudinal Study, Appendix D, Table D-285, pp. D-597 and D-598.

Figure 3-7

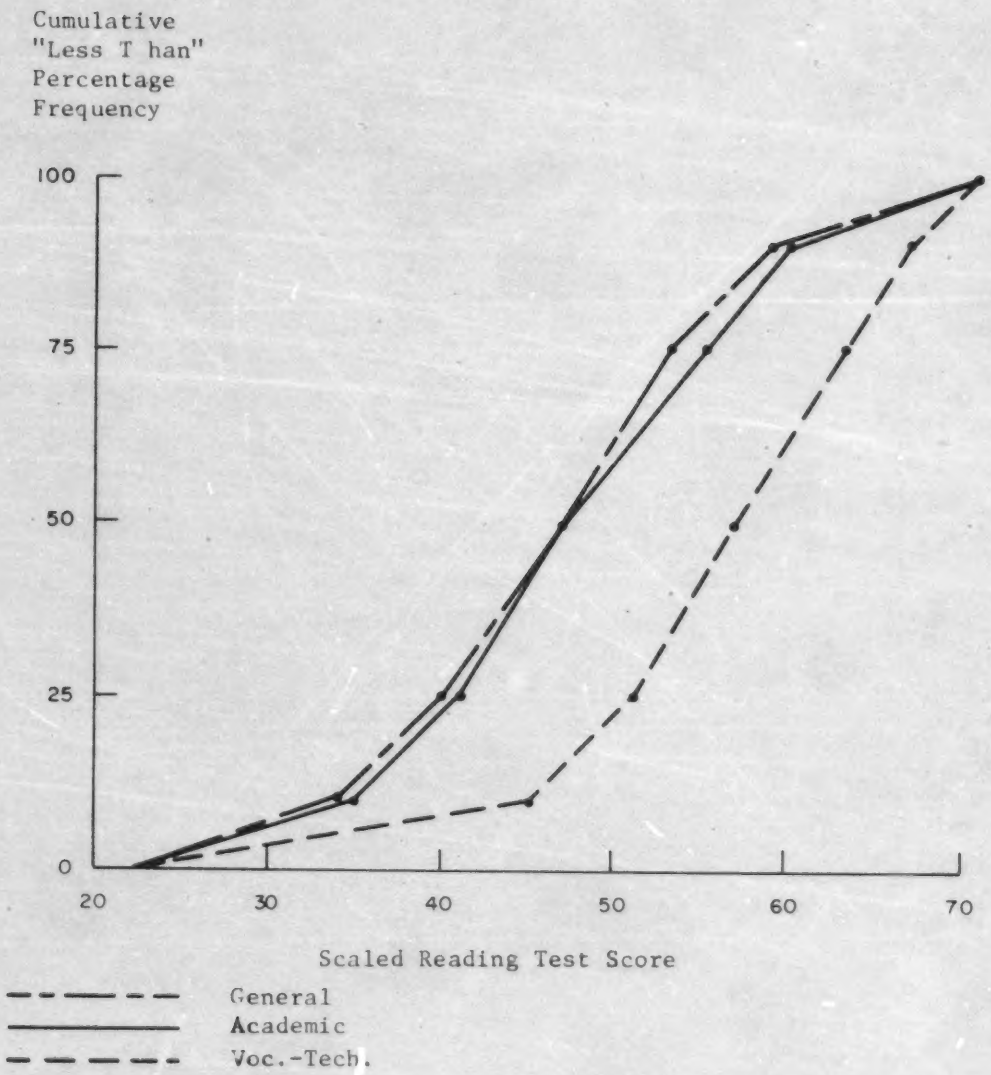
Reading Test Scores, by Sex



Source: National Longitudinal Study, Appendix D, Table D-286, pp. D-599 and D-600.

Figure 3-8

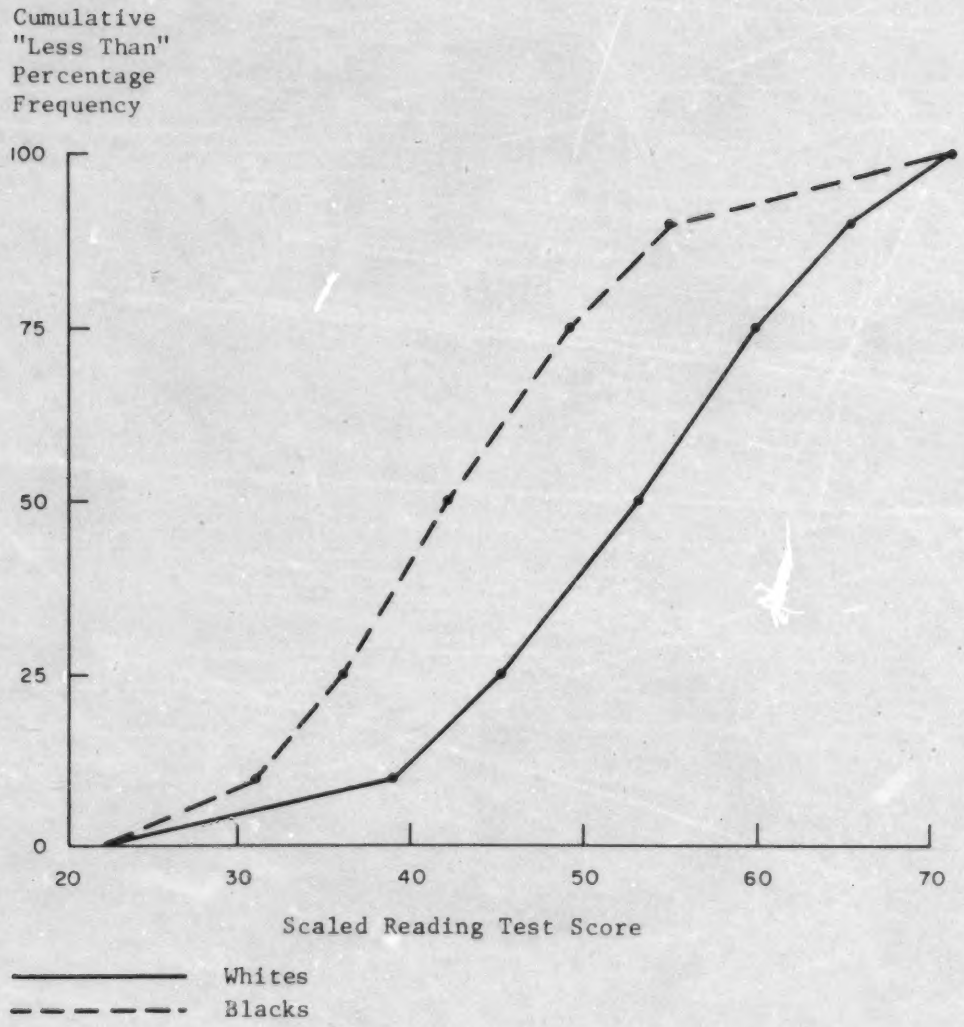
Reading Test Score, by Curriculum



Source: National Longitudinal Study, Appendix D, Table D-286, pp. D-599 and D-600.

Figure 3-9

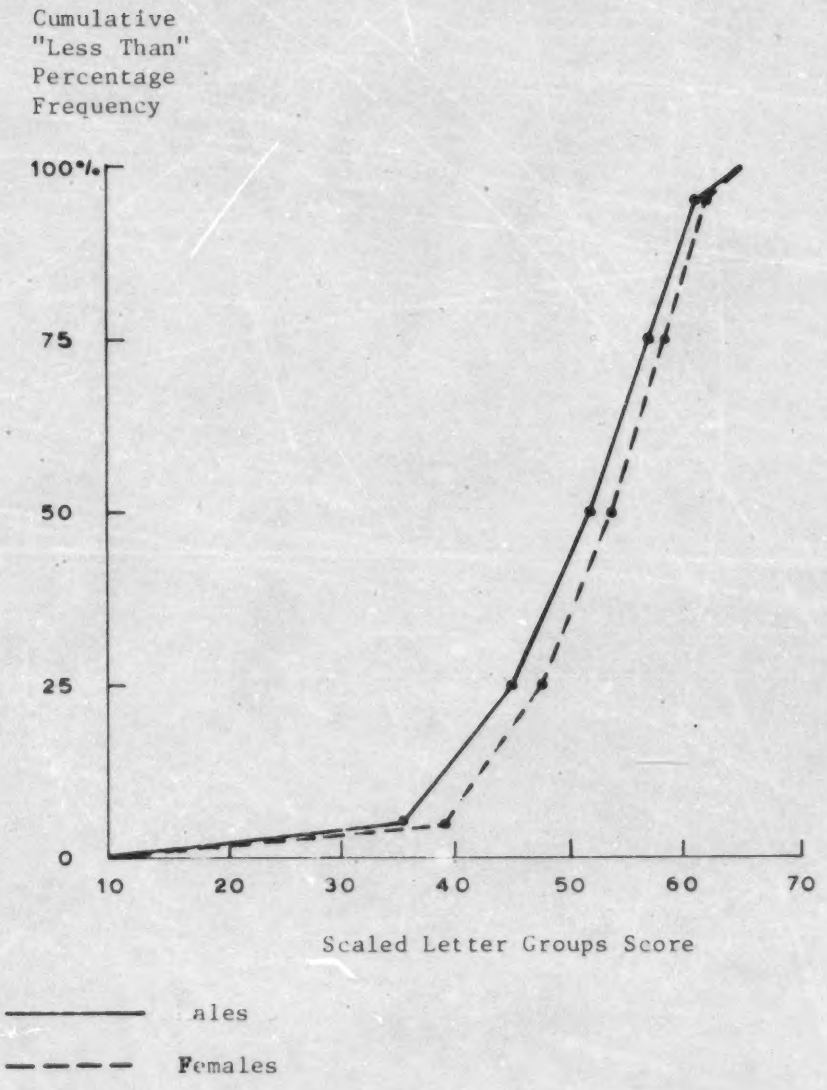
Reading Test Score, by Race



Source: National Longitudinal Study, Appendix D, Table D-286, pp. D-599 and D-600.

Figure 3-10

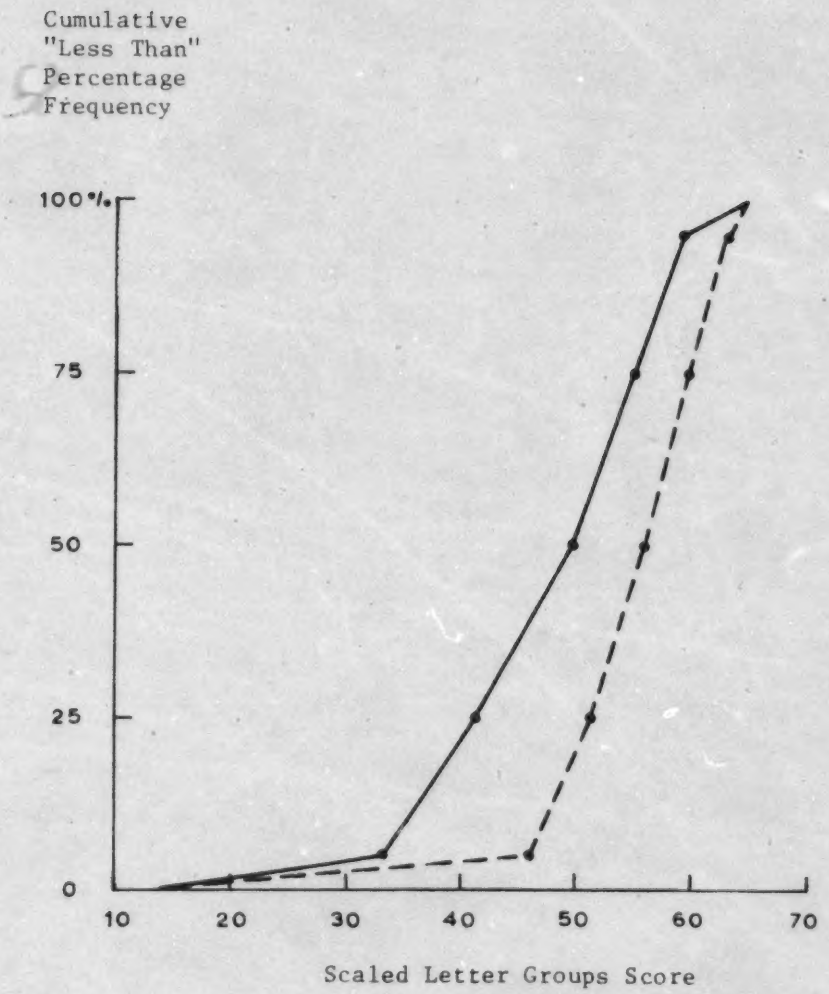
Letter Groups Scores, by Sex



Source: National Longitudinal Study, Appendix D, Table D-287, pp. D-601 and D-602.

Figure 3-11

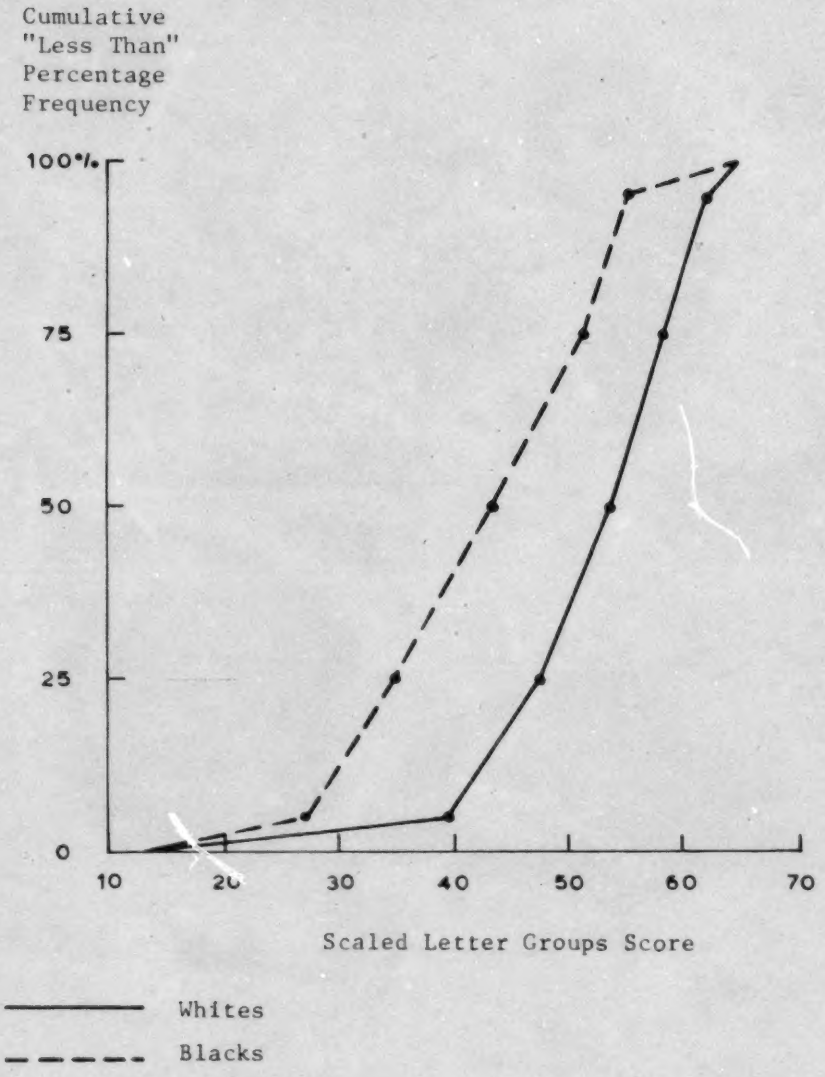
Letter Groups Scores, by Curriculum



Source: National Longitudinal Study, Appendix D, Table D-287, pp. D-601 and D-602.

Figure 3-12

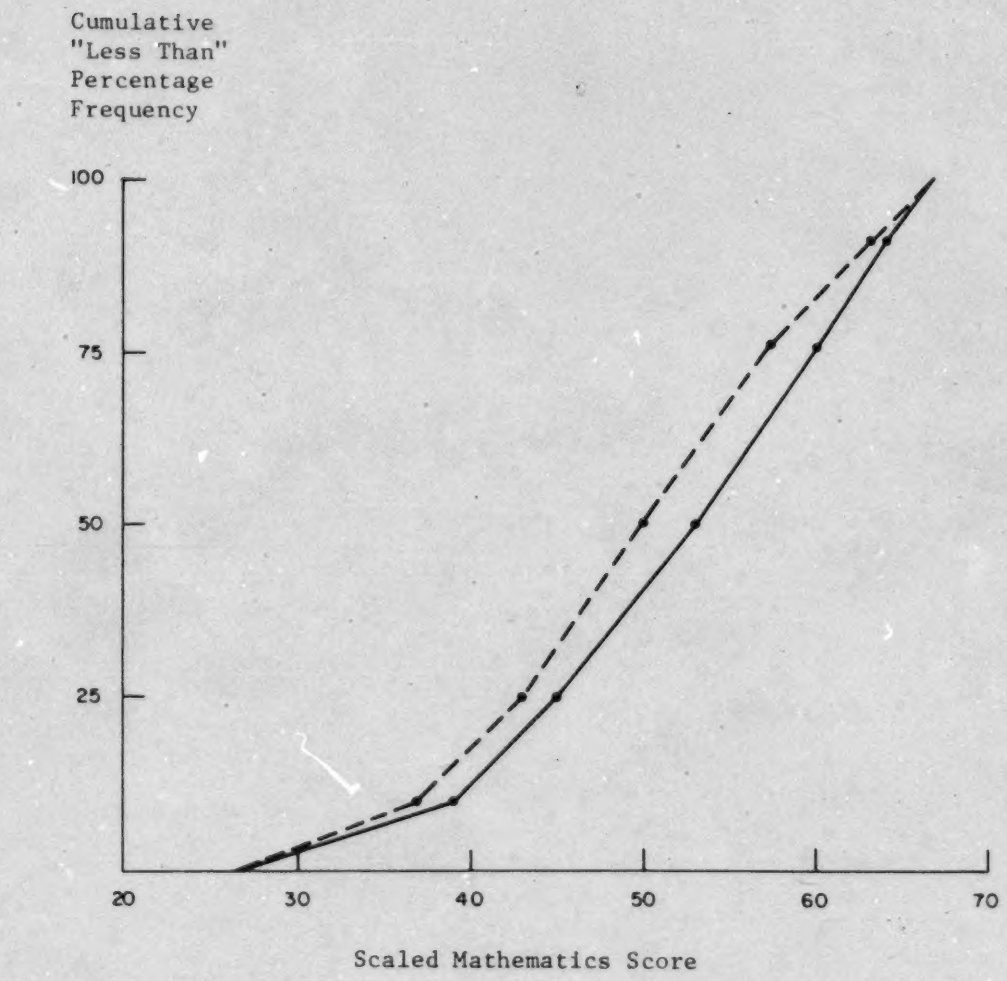
Letter Groups Scores, by Race



Source: National Longitudinal Study, Appendix D, Table D-287, pp. D-601 and D-602.

Figure 3-13

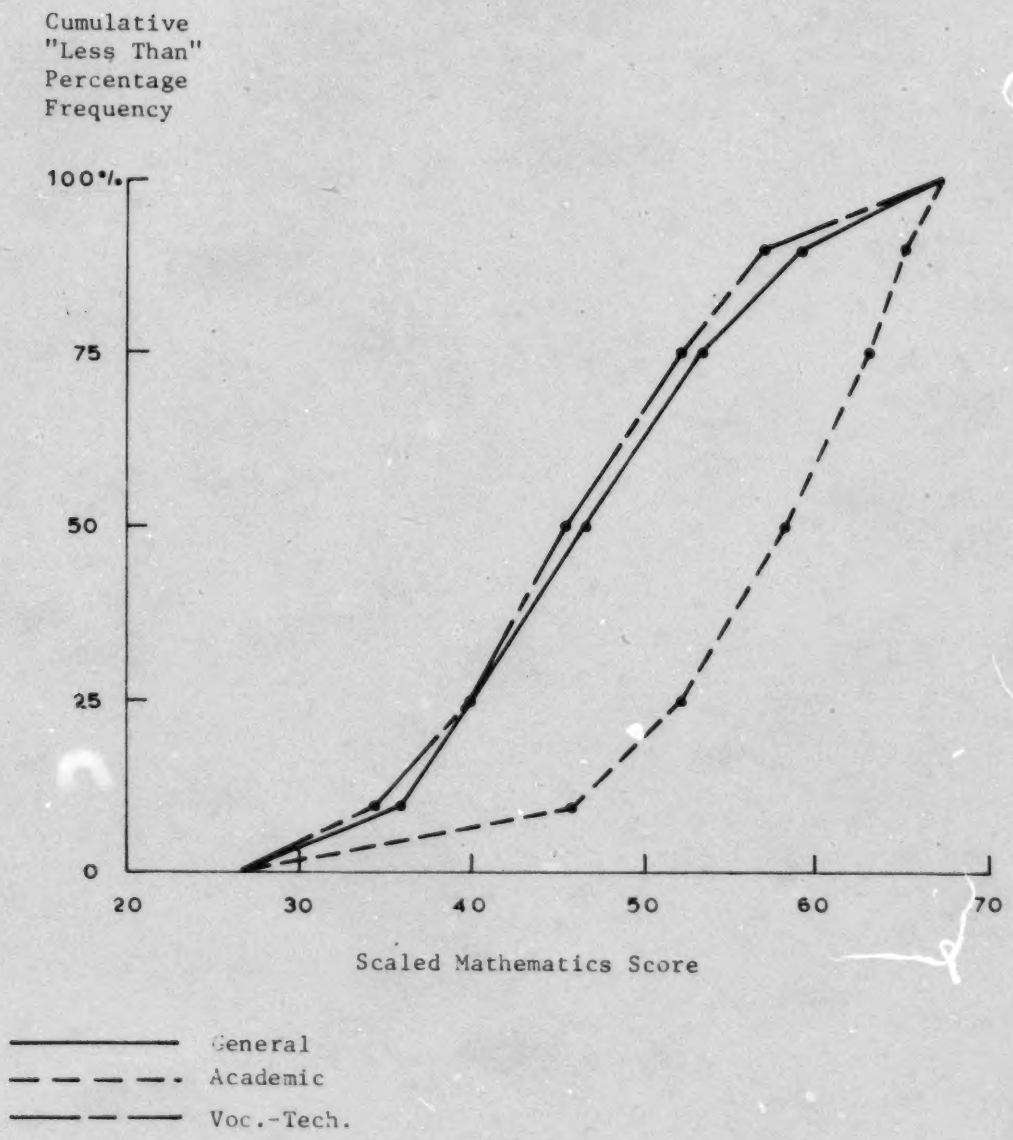
Mathematics Score, by Sex



Source: National Longitudinal Study, Appendix D, Table D-288, pp. D-603 and D-604.

Figure 3-14

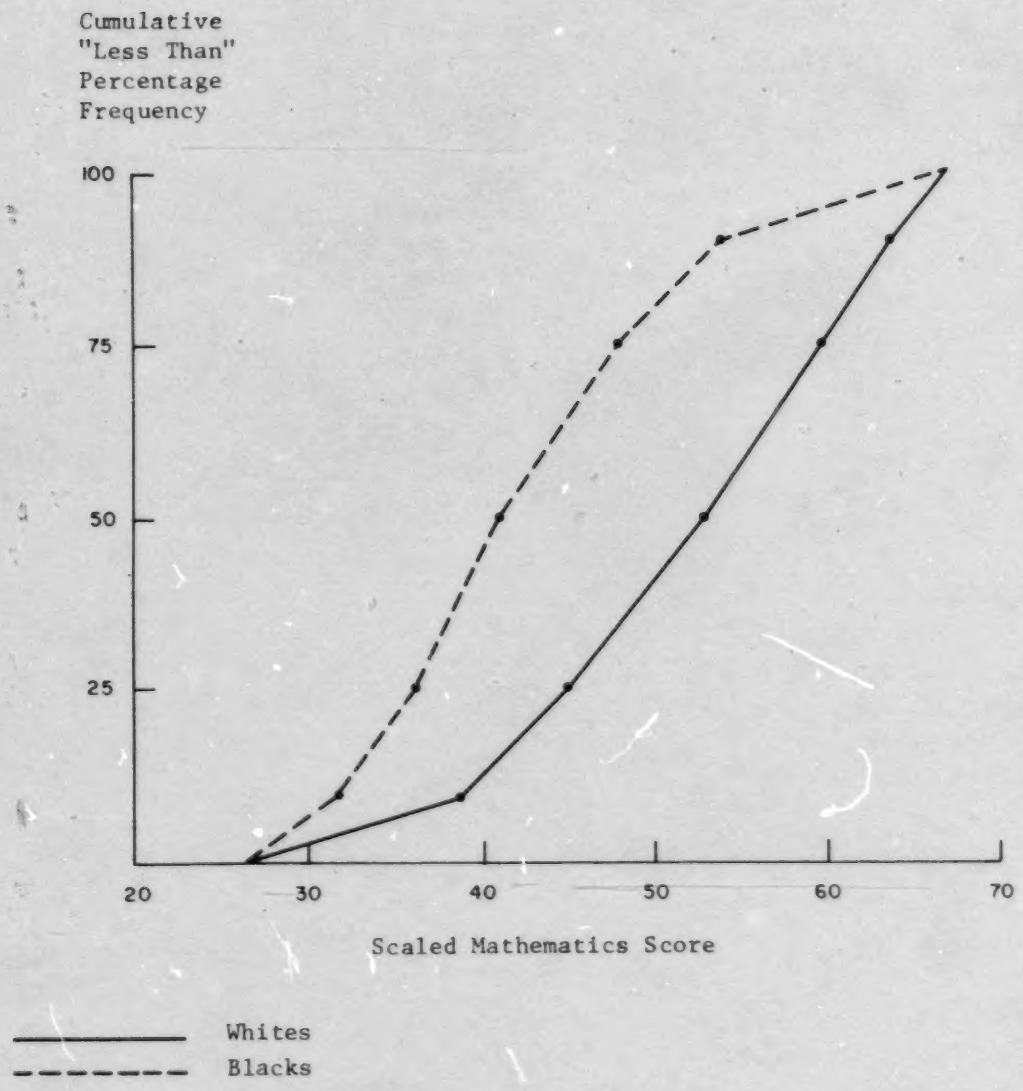
Mathematics Score, by Curriculum



Source: National Longitudinal Study, Appendix D, Table D-288, pp. D-603 and D-604.

Figure 3-15

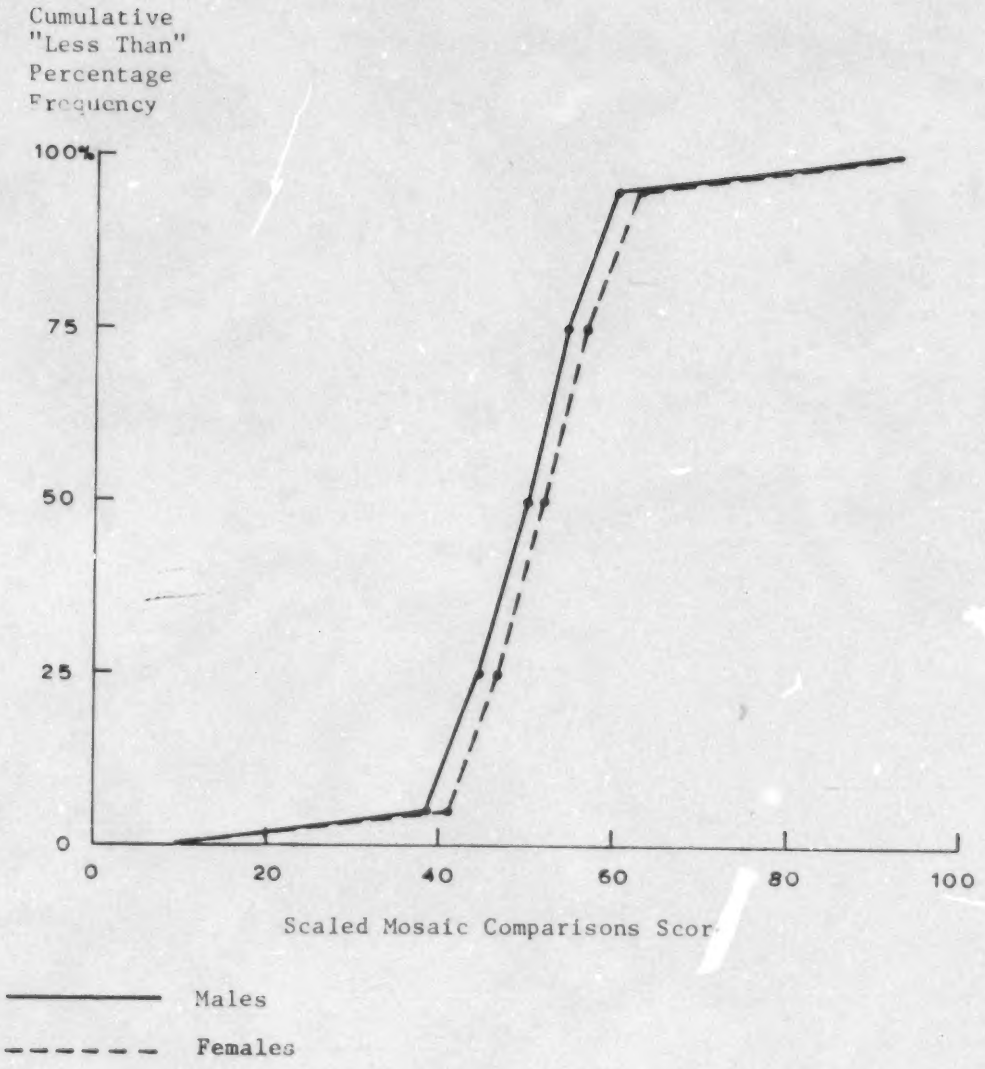
Mathematics Score, by Race



Source: National Longitudinal Study, Appendix D, Table D-288, pp. D-603 and D-604.

Figure 3-16

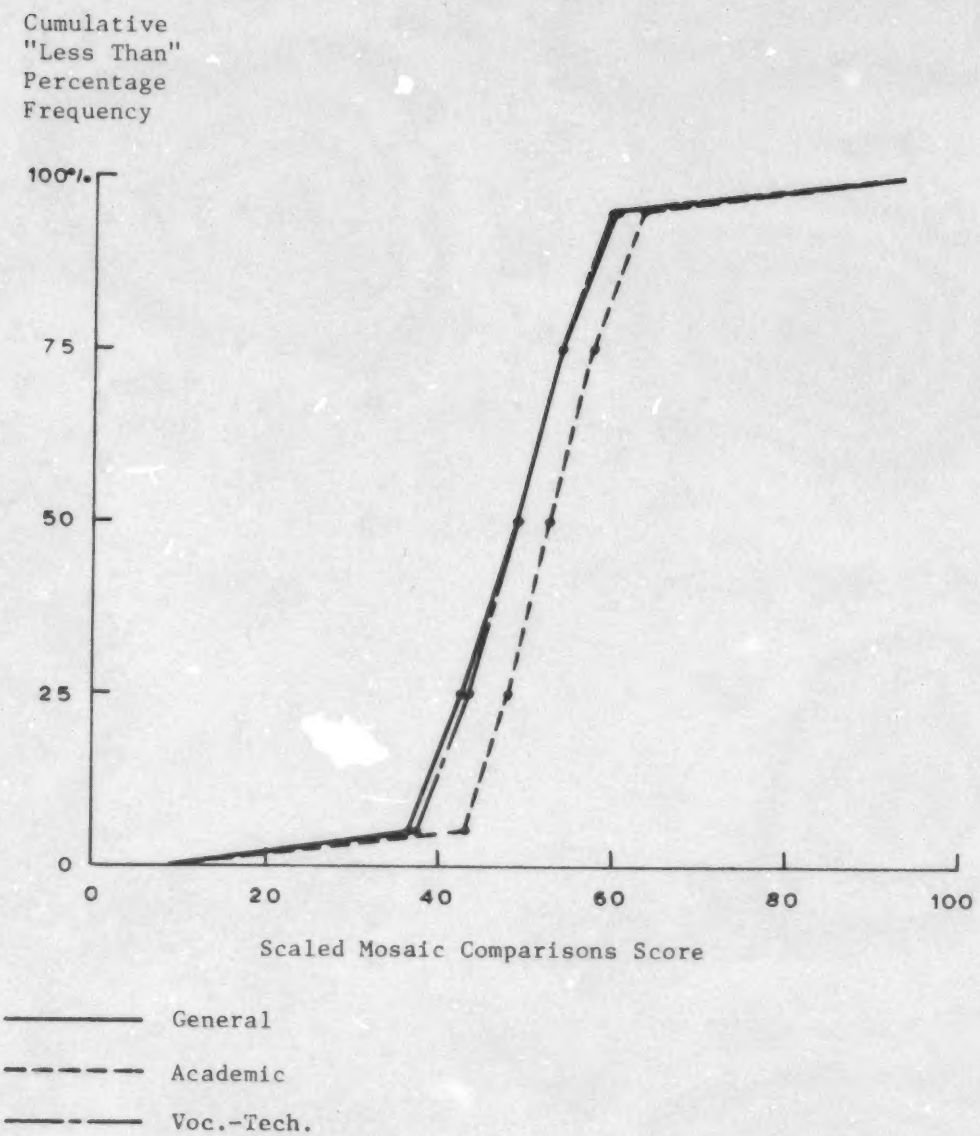
Mosaic Comparisons Score, by Sex



Source: .ational Longitudinal Study, Appendix D, Table D 292, pp. D-611 and D-612.

Figure 3-17

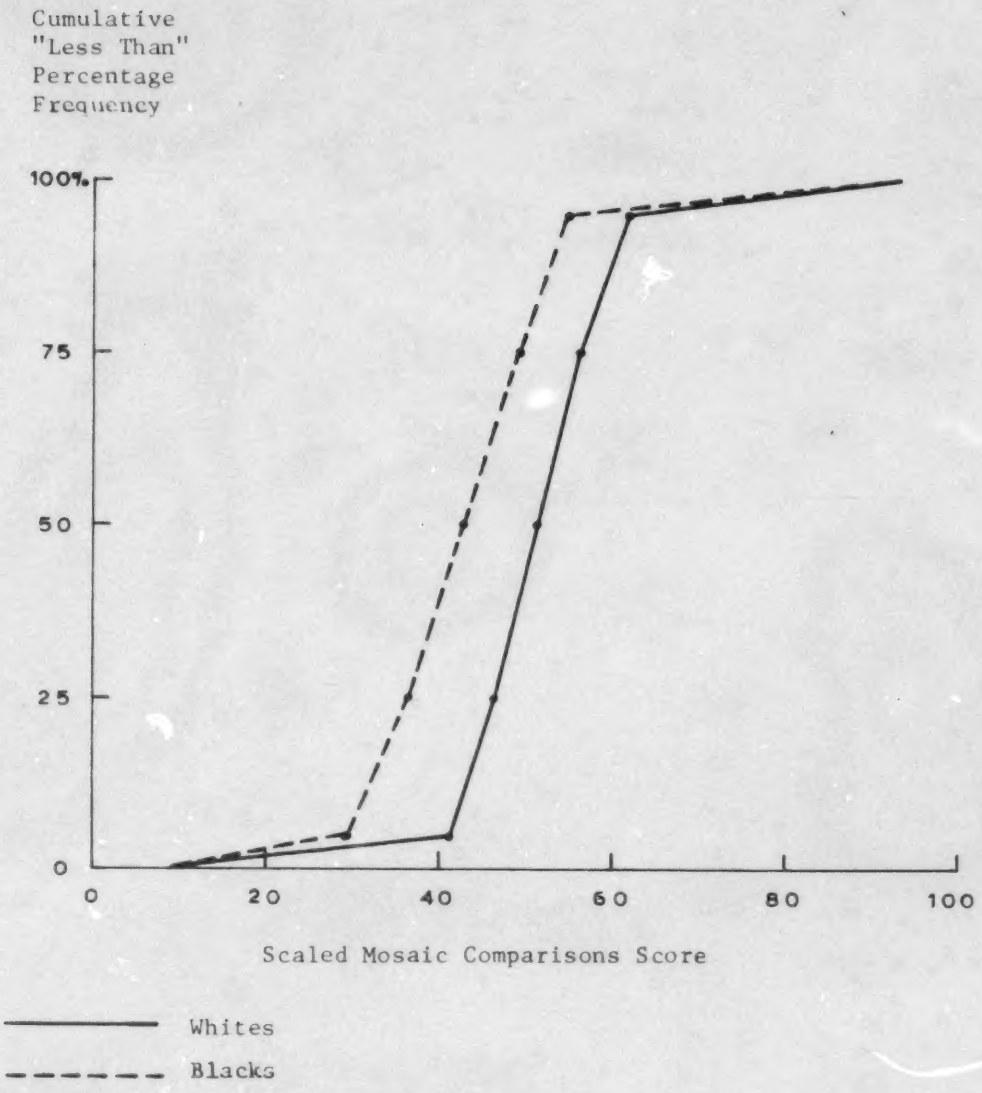
Mosaic Comparisons Score, by Curriculum



Source: National Longitudinal Study, Appendix D, Table D-292, pp. D-611 and D-612.

Figure 3-18

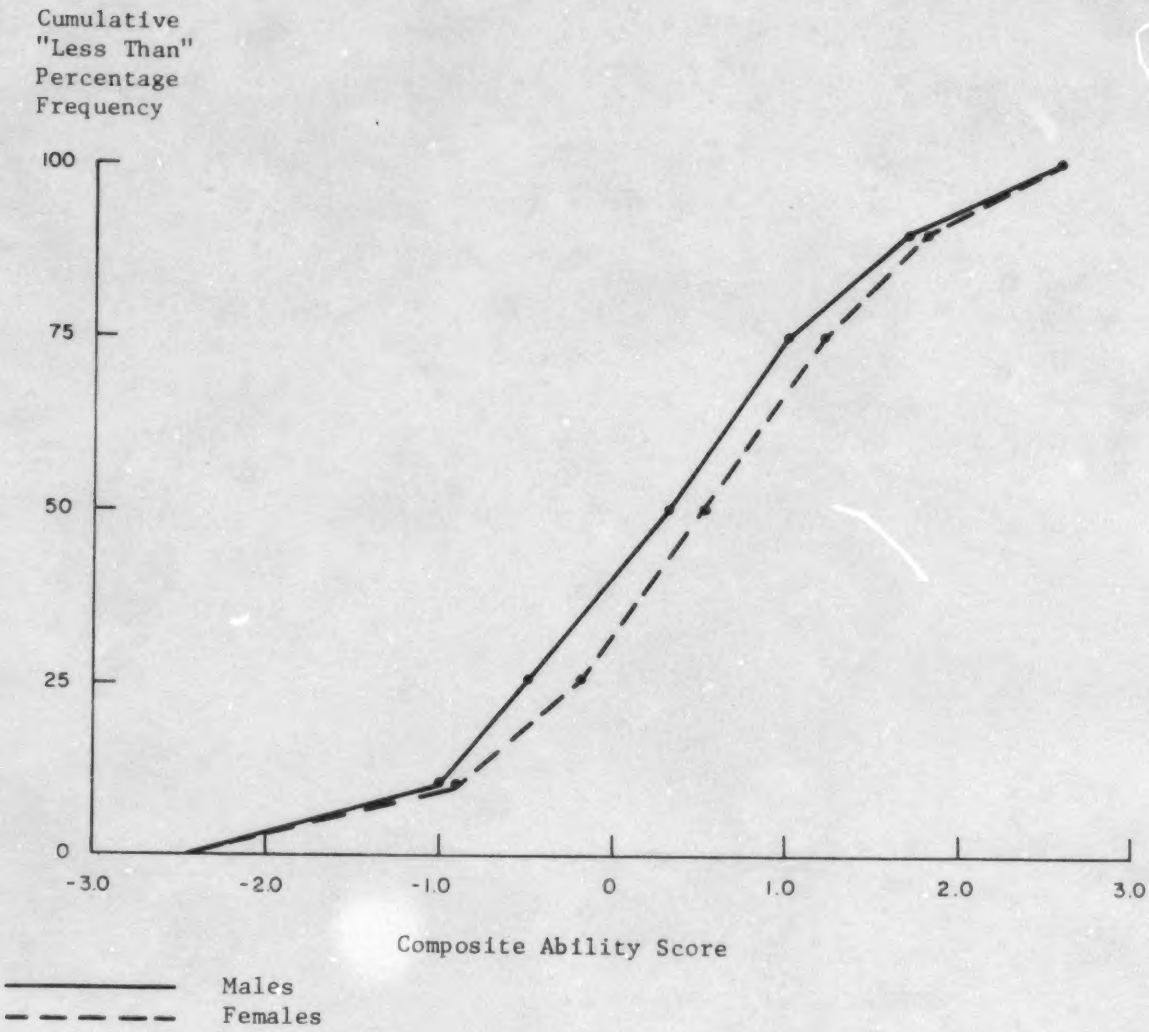
Mosaic Comparisons Score, by Race



Source National Longitudinal Study, Appendix D, Table D-292, pp. D-611 and D-612.

Figure 3-19

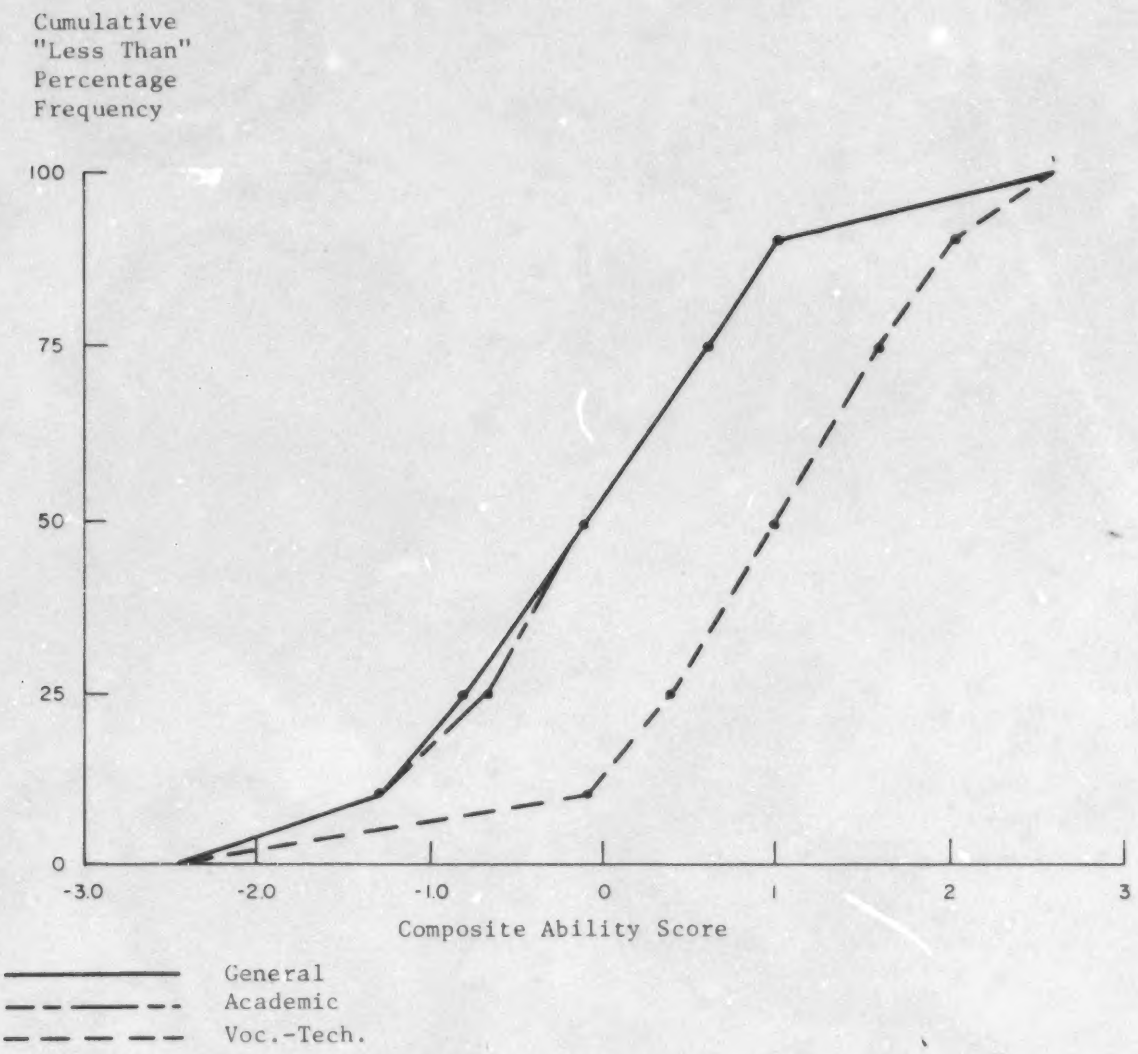
Composite Ability, by Sex



Source: National Longitudinal Study, Appendix D, Table D-318, pp. D-642 and D-643.

Figure 3-20

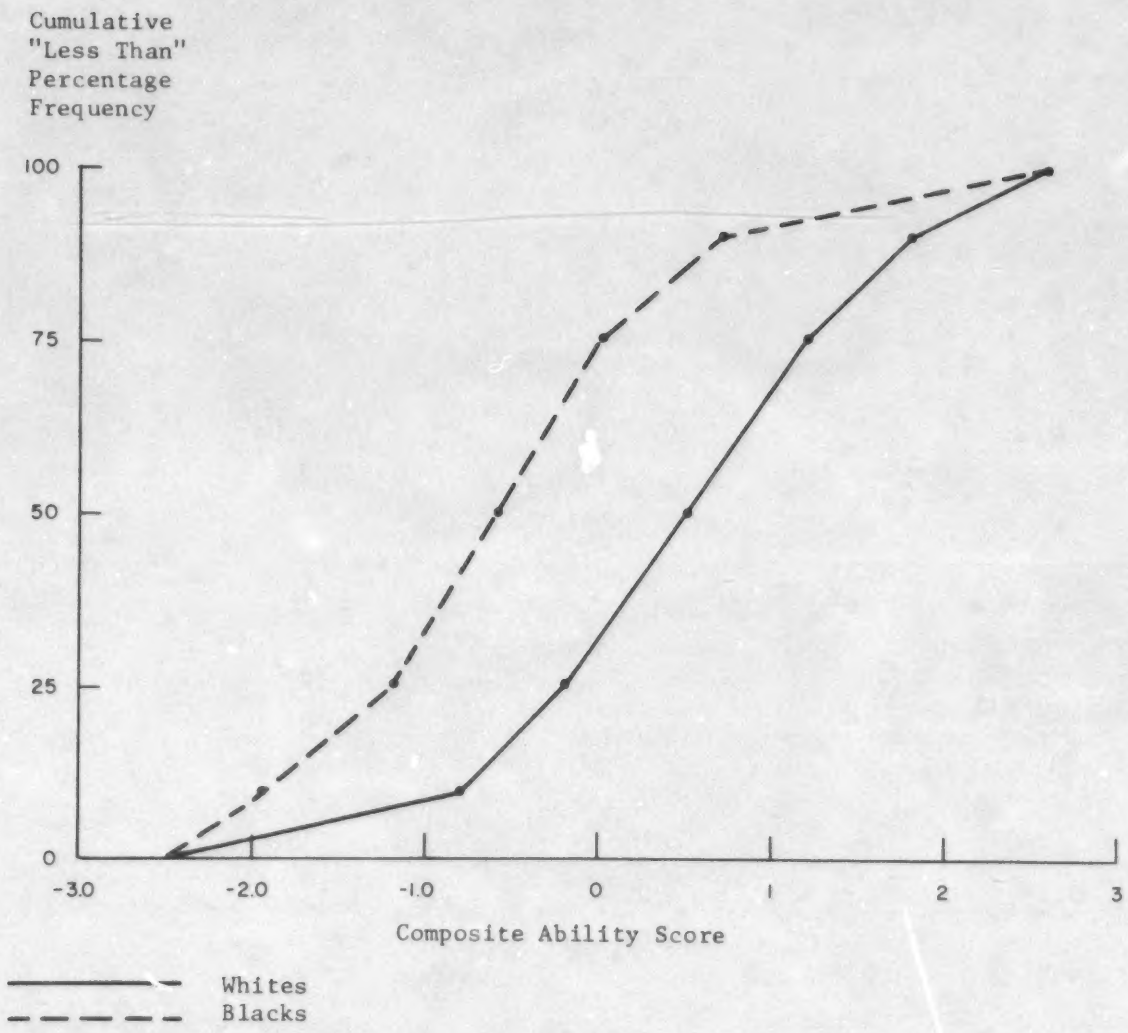
Composite Ability, by Curriculum



Source: National Longitudinal Study, Appendix D, Table D-318, pp. D-642 and D-643.

Figure 3-21

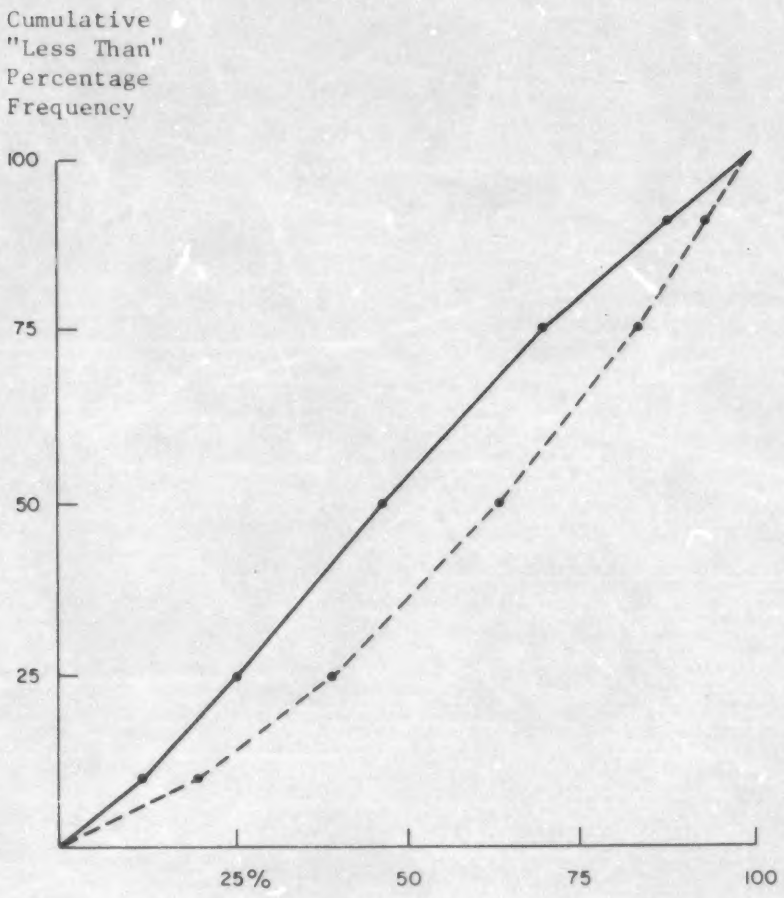
Composite Ability, by Race



Source: National Longitudinal Study, Appendix D, Table D-318, pp. D-642 and D-643.

Figure 3-22

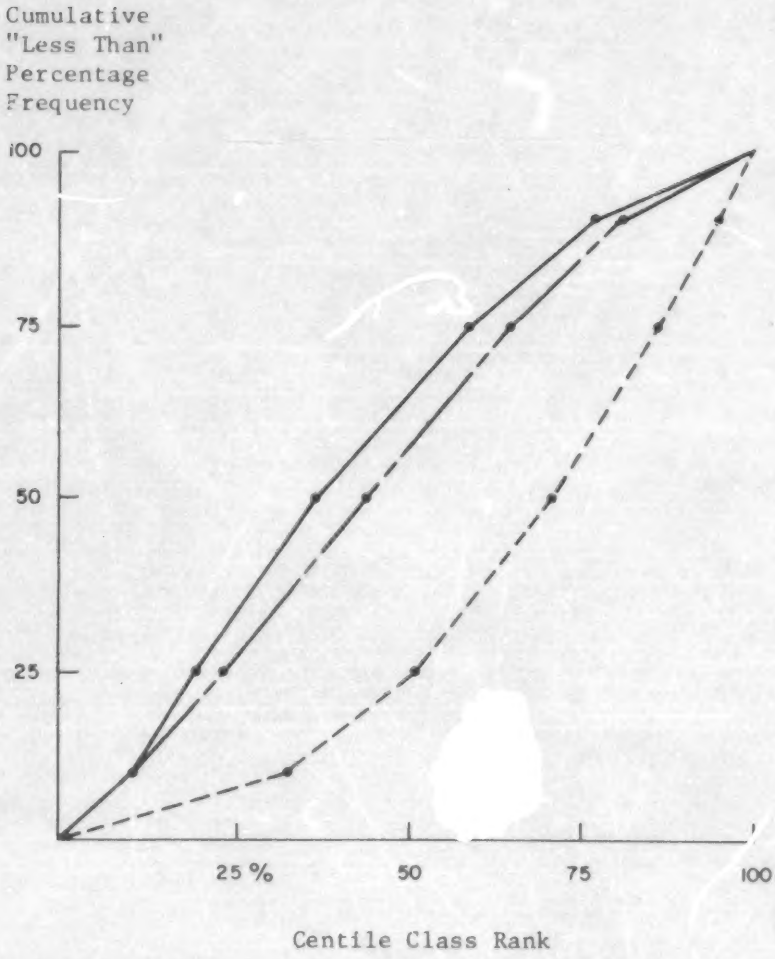
Centile Class Rank, by Sex



Source: National Longitudinal Study, Appendix D, Table D-93, pp. D-188 and D-189.

Figure 3-23

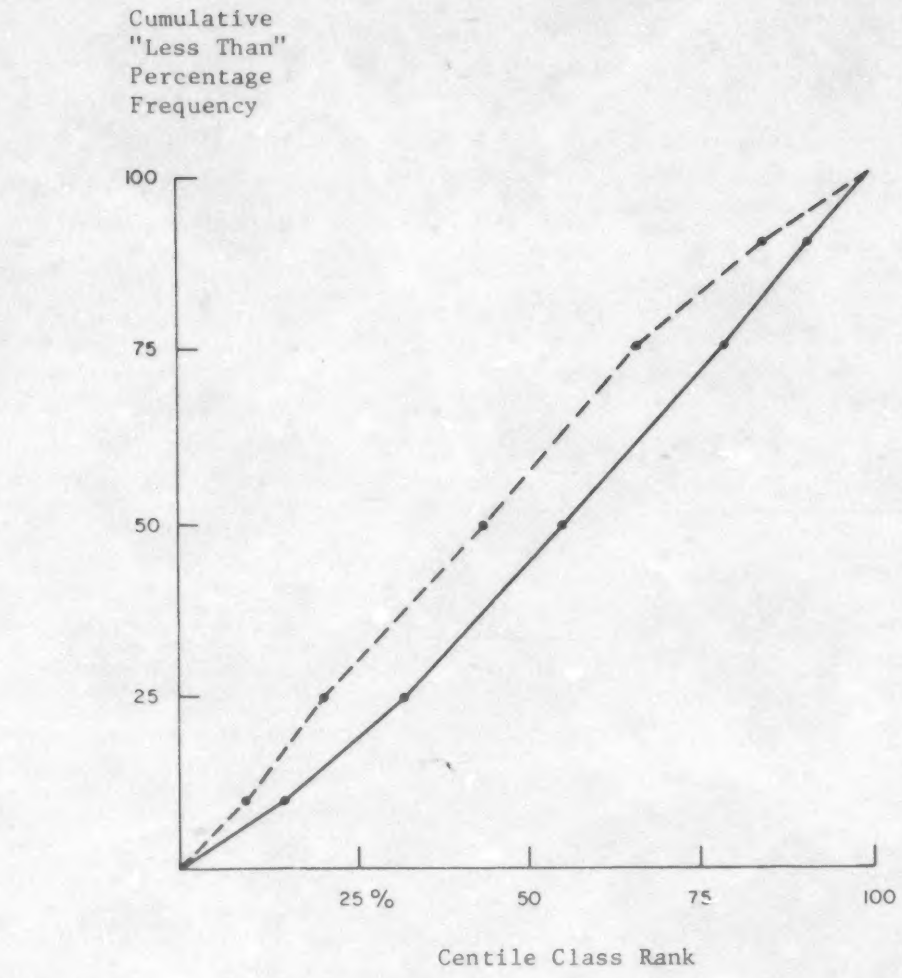
Centile Class Rank, by Curriculum



Source: National Longitudinal Study, Appendix D, Table D-93, pp. D-188 and D-189.

Figure 3-24

Centile Class Rank, by Race



Source: National Longitudinal Study, Appendix D, Table D-93, pp. D-188 and D-189.

Notes

1. Reliability, duration, and other test characteristics appear in more complete exposition between pages viii and ix of the National Longitudinal Study, Appendix D. Other sources are referenced in text.

CHAPTER 4

SOCIOECONOMIC STATUS

INTRODUCTION

Socioeconomic status (SES) of a student is typically evaluated through consideration of the educational level attained by one or both of his parents, the income of his parents, the occupations of his parents, or by the possessions which have been accumulated by the family.

Since SLS has repeatedly been shown to be an important predictor of academic success, we will discuss the SES composition of the high school class of 1972 in some detail. The development will incorporate all the criteria mentioned above, and will also consider a multivariate measure of SES which simultaneously incorporates several of the criteria.

PARENTAL OCCUPATION

Validity of the Measures

In the National Longitudinal Study students were asked to classify the occupations of their parents by designating separately for each parent which one of 14 categories best suited the parents' occupation (Figure 4-1). As a check on the validity of this item, a random subsample of the NLS student sample was selected and their parents asked to classify their occupations using the same set of categories. By subsequently matching the students' responses with those of their parents it was possible to evaluate the degree of agreement between students and parents for the item. A summary of these results is presented in Tables 4-1 and 4-2.

Surprisingly, students agreed with their parents' classification of fathers' occupations only 39% of the time, and with the classification of

Figure 4-1

Parental Occupations Items from Student Questionnaire SQ25

25. In the column under YOU, circle the one number that goes with the best description of the kind of work you would like to do. Under FATHER, circle the one number that best describes the work done by your father (or male guardian). Under MOTHER, circle the one number that best describes the work done by your mother (or female guardian). The exact job may not be listed but circle the one that comes closest. If either of your parents is out of work, disabled, retired, or deceased, mark the kind of work that he or she used to do.

	(Circle one number in each column.)		
	You	**Father**	**Mother**
CLERICAL such as bank teller, bookkeeper, secretary, typist, mail carrier, ticket agent	01	01	01
CRAFTSMAN such as baker, automobile mechanic, machinist, painter, plumber, telephone installer, carpenter	02	02	02
FARMER, FARM MANAGER	03	03	03
HOMEMAKER OR HOUSEWIFE	04	04	04
LABORER such as construction worker, car washer, sanitary worker, farm laborer	05	05	05
MANAGER, ADMINISTRATOR such as sales manager, office manager, school administrator, buyer, restaurant manager, government official	06	06	06
MILITARY such as career officer, enlisted man or woman in the armed forces	07	07	07
OPERATIVE such as meat cutter; assembler; machine operator; welder; taxicab, bus, or truck driver; gas station attendant	08	08	08
PROFESSIONAL such as accountant, artist, clergyman, dentist, physician, registered nurse, engineer, lawyer, librarian, teacher, writer, scientist, social worker, actor, actress	09	09	09
PROPRIETOR OR OWNER such as owner of a small business, contractor, restaurant owner	10	10	10
PROTECTIVE SERVICE such as detective, policeman or guard, sheriff, fireman	11	11	11
SALES such as salesman, sales clerk, advertising or insurance agent, real estate broker	12	12	12
SERVICE such as barber, beautician, practical nurse, private household worker, janitor, waiter	13	13	13
TECHNICAL such as draftsman, medical or dental technician, computer programmer	14	14	14

Table 4-1

Validity Study

Percent Frequency of Occupational Categories

For Fathers

Occupational Category	Percent Frequency From Parent	Percent Frequency From Student	Percent Agreement
Clerical	4.31	1.57	23
Craftsman	14.09	8.19	36
Farmer	3.56	2.58	63
Homemaker	1.69	--	--
Laborer	4.95	6.45	35
Manager	10.36	9.45	53
Military	1.27	1.97	100
Operative	12.85	6.97	25
Professional	14.51	12.83	66
Proprietor	10.57	7.69	41
Protective Services	2.45	1.56	64
Sales	3.72	3.42	43
Service	2.10	3.99	61
Technical	2.93	1.67	23
No Response	10.66	21.68	--
Overall Percent Agreement (for all categories)			39

Source: National Longitudinal Study Report, Appendix F, Table F-16, pp. F-227 and F-228.

Table 4-2

Validity Study

Percent Frequency of Occupational Categories

For Mothers

Occupational Category	Percent Frequency From Parent	Percent Frequency From Student	Percent Agreement
Clerical	21.68	16.70	60
Craftsman	1.24	.29	23
Farmer	.16	1.52	100
Homemaker	42.09	39.37	71
Laborer	2.22	.26	--
Manager	2.33	.50	18
Military	--	--	--
Operative	6.11	3.99	45
Professional	10.47	9.05	69
Proprietor	1.91	.89	26
Protective Services	.52	.28	54
Sales	2.79	2.72	31
Service	7.31	6.38	37
Technical	--	.60	--
No Response	1.17	17.45	--
Overall Percent Agreement (for all categories)			58

Source: National Longitudinal Study Report, Appendix F, Table F-16, pp. F-229 and F-230.

mothers' occupations only 58% of the time. Fathers' occupation categories having the lowest agreement rates were Clerical (23%), Technical (23%), and Operative (25%), while the highest rates of agreement were found in Military (100%), Professional (66%), Protective Services (64%), and Farmer (63%).

Mothers' occupations having the lowest agreement rates were Laborer (0%), Manager (18%), Craftsman (23%), and Proprietor (26%), and the highest rates of agreement were found in Farmer (100%), Homemaker (71%), and Professional (69%).

The higher overall rate of agreement in mothers' occupational categories, compared to that of fathers, almost entirely can be explained by the high frequency category "Homemaker," with its high (71%) agreement.

Despite the low overall agreement between students and their parents, the percentage frequencies produced by students and parents for the categories are quite similar. The highest discrepancy in fathers' occupation is found in the Operative category where the difference in percentage frequency is only 5.88%. The similar result for mothers' occupation, found in the Clerical category, is a maximum discrepancy of 4.98%. Since, for purposes of our discussion, we will rely largely upon the percentage frequencies of separate occupational categories, we may have confidence that the results are reasonably valid.

Fathers' Occupational Categories

Percentage frequency distributions of fathers' occupational categories are shown in Table 4-3 for selected subgroups of the high school class of 1972. Listings for male and female students' fathers were not appreciably different from the Overall column and were therefore not tabulated. Table 4-3 omits 4,548 students from the sample owing to missing data and 548 students belonging to ethnic subgroups too small to be analyzed here.

Table 4-3

Percentage Frequencies of Fathers' Occupational Categories

Category	General	Academic	Voc.-Tech.	White	Black	Overall
A. Clerical	2.79	2.59	2.45	2.57	3.18	2.61
B. Craftsman	19.84	14.58	21.97	17.37	21.30	17.64
C. Farmer	6.27	3.83	6.82	5.18	4.69	5.15
D. Homemaker	.30	.08	.40	.17	.80	.21
E. Laborer	11.31	8.05	15.08	9.56	23.03	10.48
F. Manager	12.48	17.33	8.37	14.74	4.58	14.05
G. Military	3.13	2.34	2.84	2.53	4.58	2.67
H. Operative	13.94	7.83	17.44	11.10	18.47	11.60
I. Professional	10.08	21.27	5.37	15.44	5.01	14.73
J. Proprietor	6.83	7.48	6.66	7.43	2.92	7.12
K. Protective Serv.	2.65	2.38	2.91	2.61	1.94	2.57
L. Sales	5.18	7.05	4.95	6.44	1.15	6.08
M. Service	2.64	1.61	2.31	1.74	6.25	2.05
N. Technical	2.56	3.57	2.44	3.11	2.10	3.04

Source: National Longitudinal Study, Appendix B-1, Table B-161.

Subtracting the Overall column from each of the columns and charting the resulting differences produced Figures 4-2 and 4-3. Letters at the bottom of these figures correspond to the occupational categories given in Table 4-3. Figure 4-2 indicates that fathers' occupations differ according to the curriculum of the student. General curriculum students tend to be slightly (2%) higher than the national figures in proportion of fathers having occupations in the Craftsman and Operative categories; they also tend to have proportionally fewer (5%) fathers in the professional category. Academic students tend to be somewhat overrepresented in fathers from Managerial (3%) and Professional (6%) categories, and underrepresented in fathers from Craftsman (3%), Labor (2%), and Operative (4%) categories.

The greatest deviations from the national figures, however, are to be found among students in Voc.-Tech. curricula. Such students are overrepresented in fathers from Craftsman (4%), Labor (5%), and Operative (6%) categories, and underrepresented in fathers from Managerial (6%) and Professional (9%) categories.

Black-White racial differences may be seen in Figure 4-3. Blacks tend to be overrepresented in Craftsman (4%), Labor (13%), Operative (7%), and Service (4%) occupations, while being underrepresented in Managerial (9%), Professional (10%), Proprietor (4%), and Sales (5%).

Summarizing these findings, it appears that the socioeconomic status of Academic students exceeds that of General students who, in turn come from higher SES backgrounds than do Voc.-Tech. students, as evaluated by the occupations of the fathers of these students. In a similar way we observe that the SES level of Black students is lower than that of Whites.

We may remove some of the subjectivity of this evaluation by applying a set of weights to the occupational categories. These weights, due to Duncan (1)

Figure 4-2

Father's Occupation

Percentage Deviation from National Distribution of Occupational Percentages

(by Curriculum)

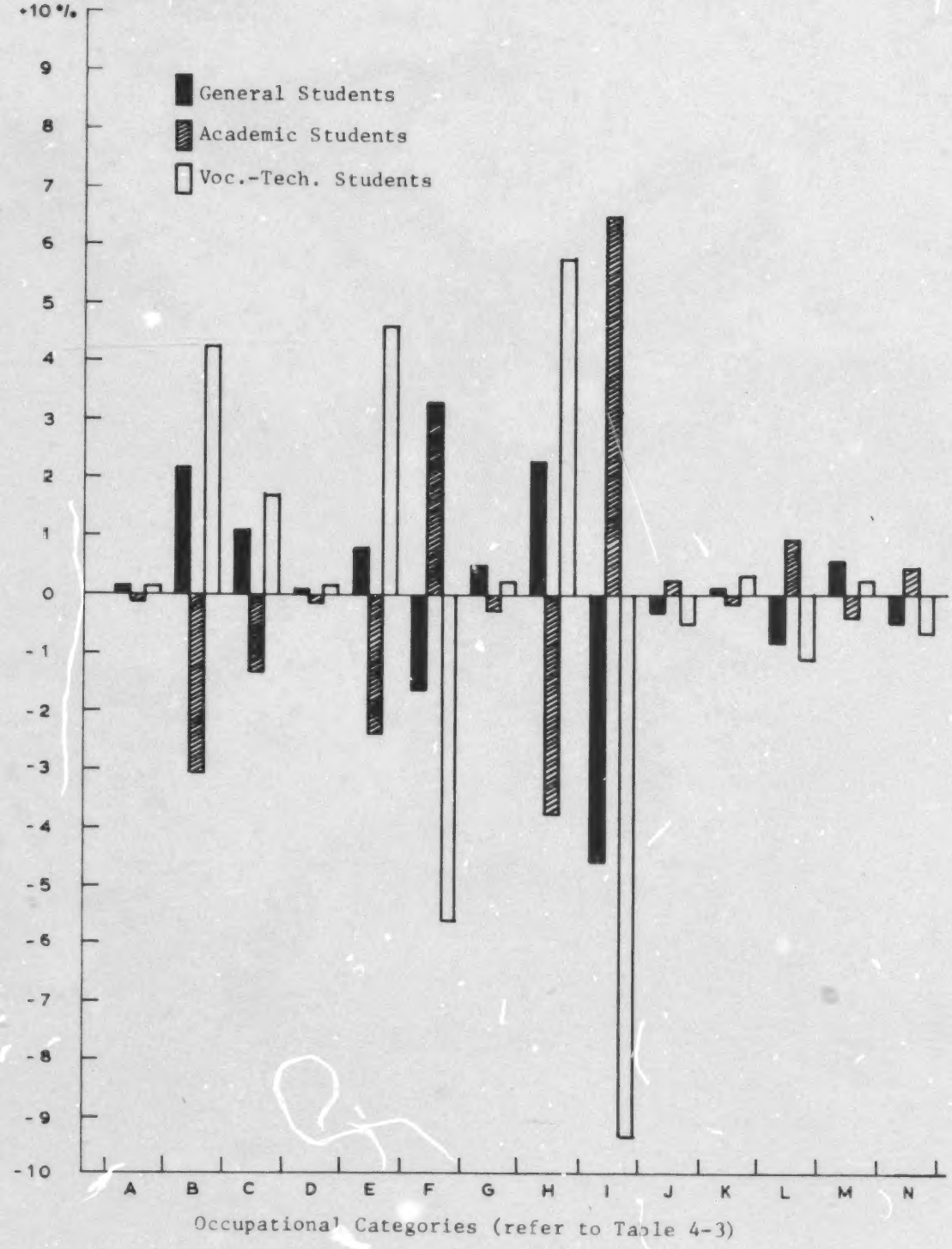
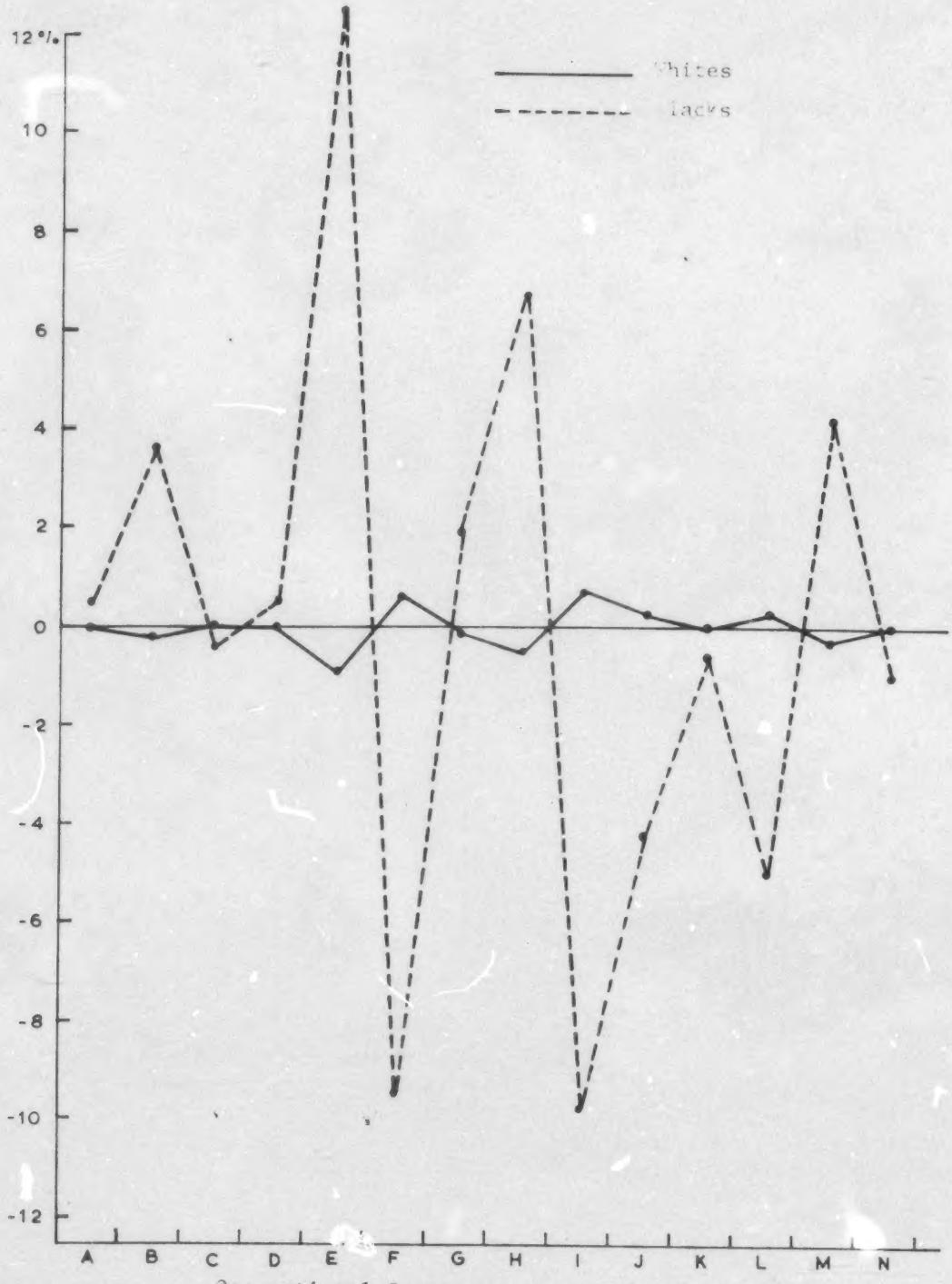


Figure 4-3

Father's Occupation

Percentage Deviation from National Distribution of Occupational Percentages

(By Race)



scale the occupational categories by socioeconomic status. Two categories, Homemaker and Military, each of which reflect broad SES ranges, are not included in the Duncan scaling. Ogives of the distribution of the Duncan SES index are presented in Figure [illegible] for the three curricula. The ogives clearly show the relationship previously suggested. Moreover, the median SES index value would be approximately 49 for Academic students, 25 for General students, and 20 for Voc.-Tech. students.

Mothers' Occupational Categories

The percentage frequency distribution of mothers' occupational categories are presented in Table 4-4. As before, the differences in distributions produced by male and female students were inappreciable and are therefore not shown. Table 4-4 omits 4070 students from the National Longitudinal Study for whom key data were missing and an additional 387 students in categories of minority groups too small to allow separate analysis.

Deviations of subgroups from the overall (national) percentages are displayed in Figures 4-5 (for curricula) and 4-6 (race). The Duncan SES index is portrayed for the three curricula in the ogives of Figure 4-7.

Figure 4-5 suggests that mothers of students in the General curriculum do not appreciably differ from the overall percentage distribution of occupations, while mothers of Academic students tend to be overrepresented (3%) in the Professional group and underrepresented (3%) in the Homemaker group.

Vocational-Technical students again reflect the greatest discrepancies. They tend to be overrepresented (6%) in mothers in the Homemaker category and underrepresented in the Clerical (3%) and Professional (5%) categories.

Racial differences in occupational categories (Figure 4-6) are also prominent in mothers as they were in fathers. Mothers of Black students tend

Figure 4-4

Duncan SES Index for Father's Occupation

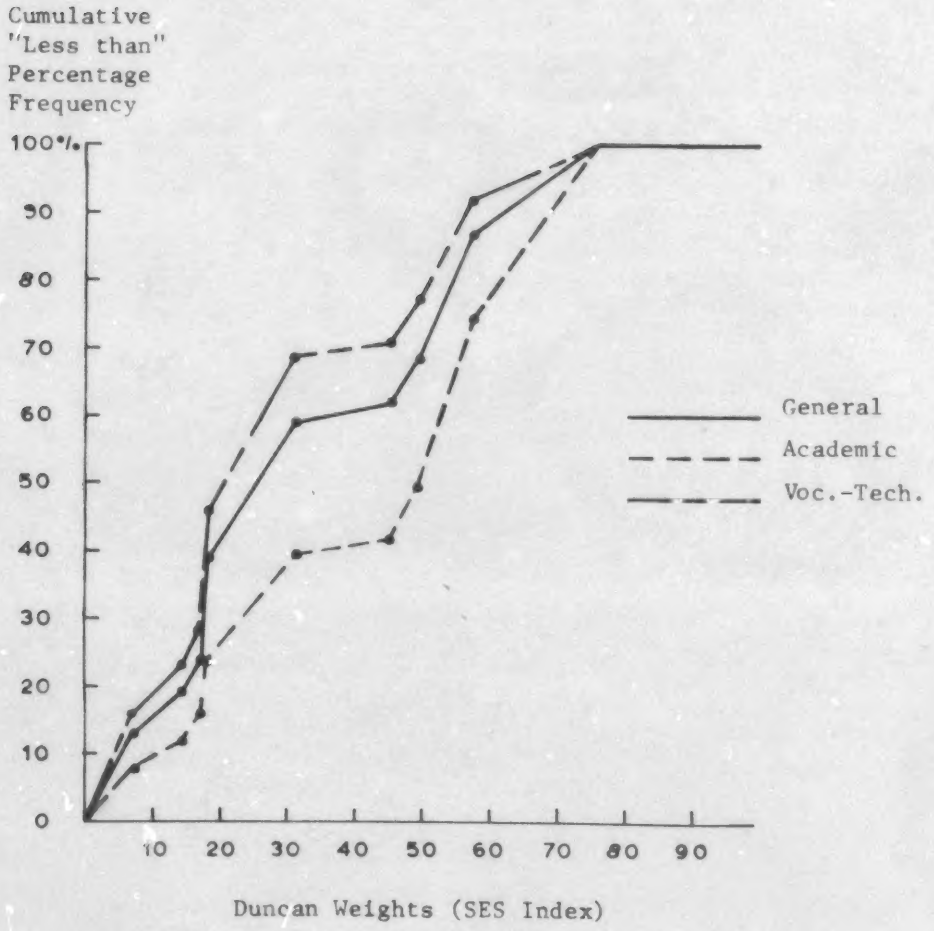


Table 4-4

Percentage Frequencies of Mothers' Occupational Categories

Category	General	Academic	Voc.-Tech.	White	Black	Overall
A. Clerical	14.73	18.66	13.37	17.02	8.54	16.37
B. Craftsman	.52	.66	.91	.64	1.06	.68
C. Farmer	1.52	.70	1.39	.95	2.68	1.09
D. Homeworker	55.19	51.70	60.81	55.09	50.42	54.73
E. Laborer	1.38	1.23	1.67	1.33	1.83	1.37
F. Manager	1.80	1.70	1.50	1.65	2.04	1.68
G. Military	.21	.08	.24	.14	.25	.15
H. Operative	3.53	2.40	4.37	3.04	4.51	3.16
I. Professional	7.15	12.55	4.72	9.09	11.46	9.28
J. Proprietor	1.39	1.31	.79	1.26	.68	1.22
K. Protective Serv.	.32	.22	.16	.23	.29	.24
L. Sales	3.63	3.50	3.84	3.75	2.07	3.62
M. Service	7.98	4.60	5.54	5.15	13.06	5.76
N. Technical	.64	.69	.69	.64	1.11	.68

Source: National Longitudinal Study, Appendix B-1, Table B-162.

Figure 4-5

Mother's Occupation

Percentage Deviation from National Distribution of Occupational Percentages

(by Curriculum)

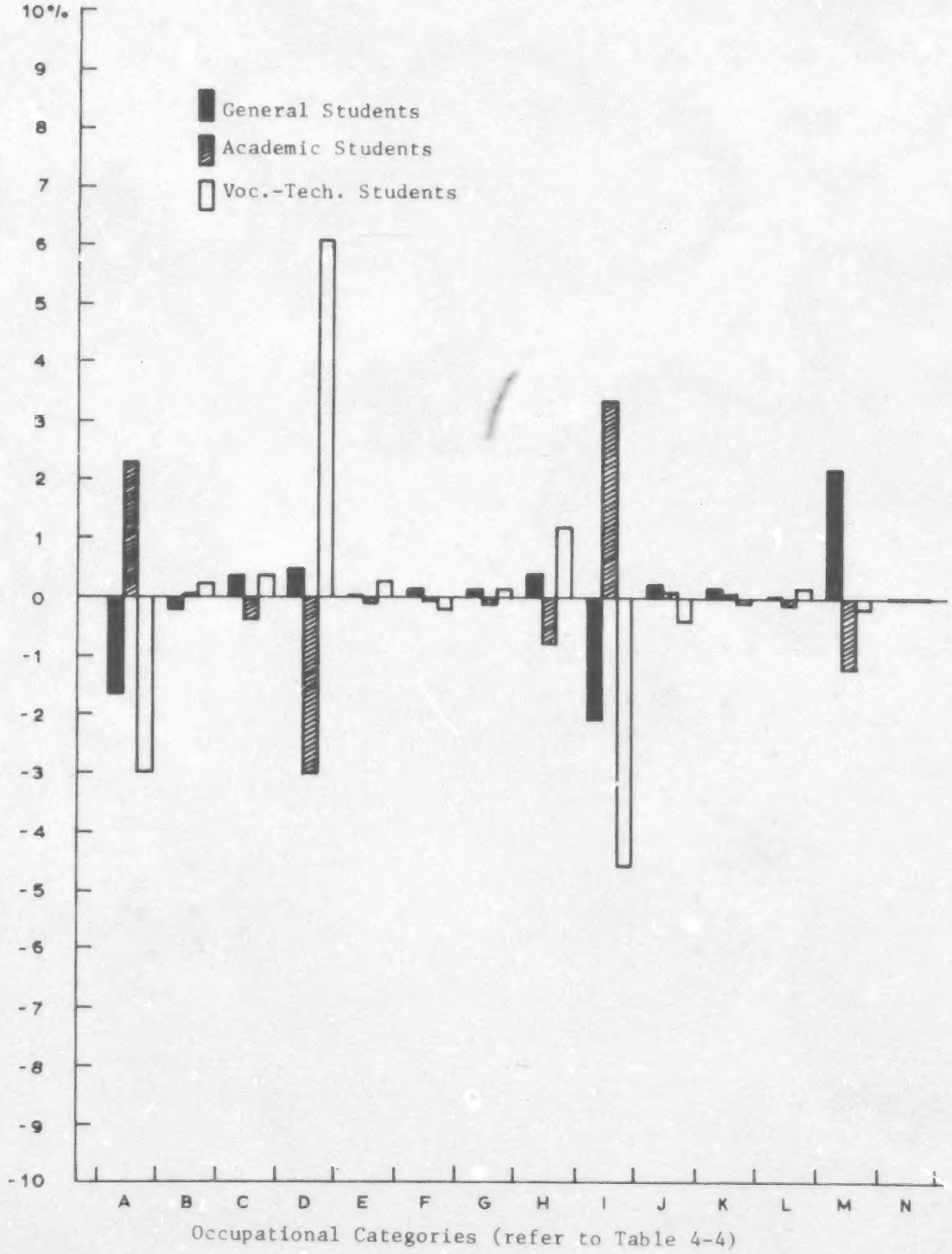


Figure 4-6

Mother's Occupation

Percentage Deviation from National Distribution of Occupational Percentages

(by Race)

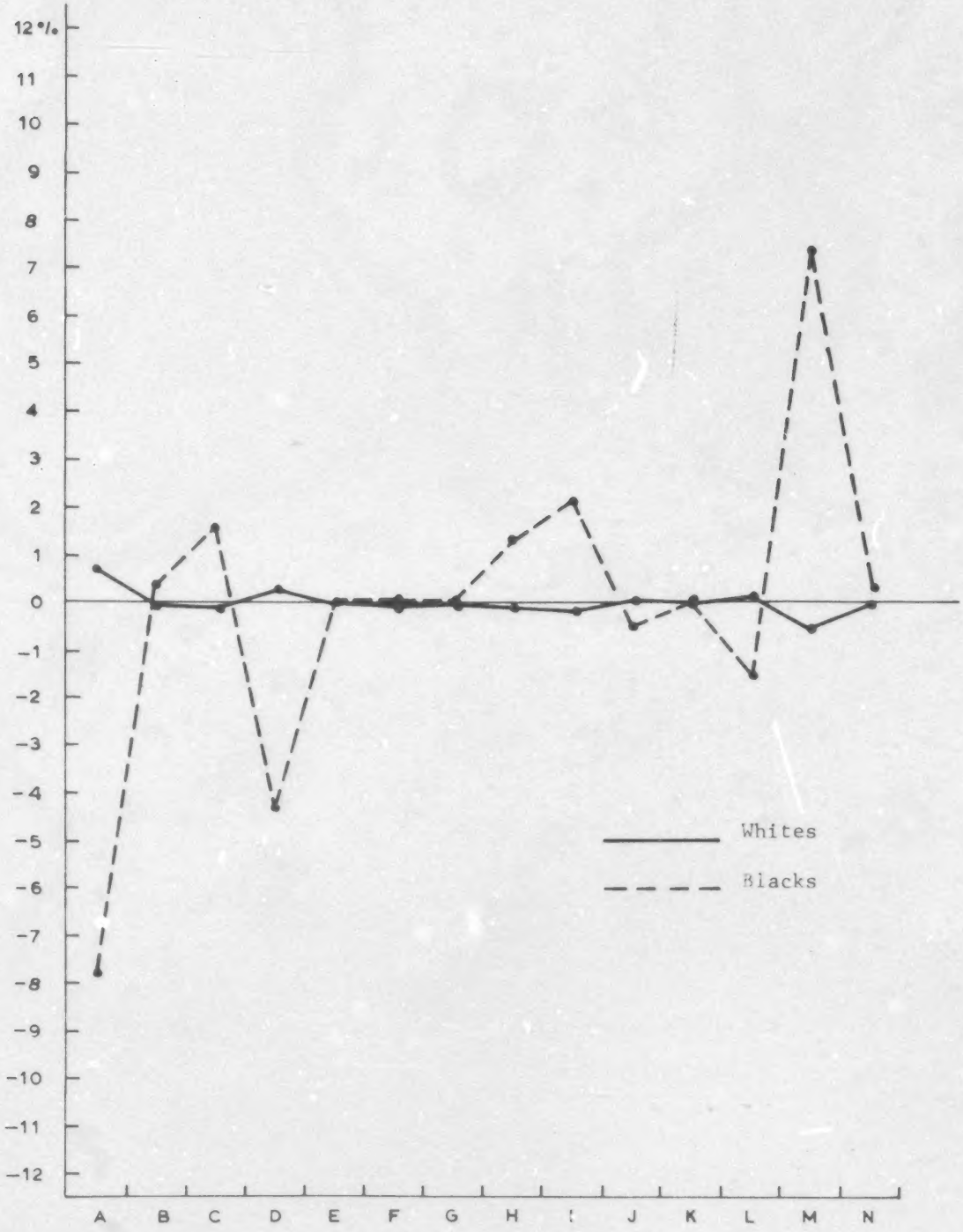
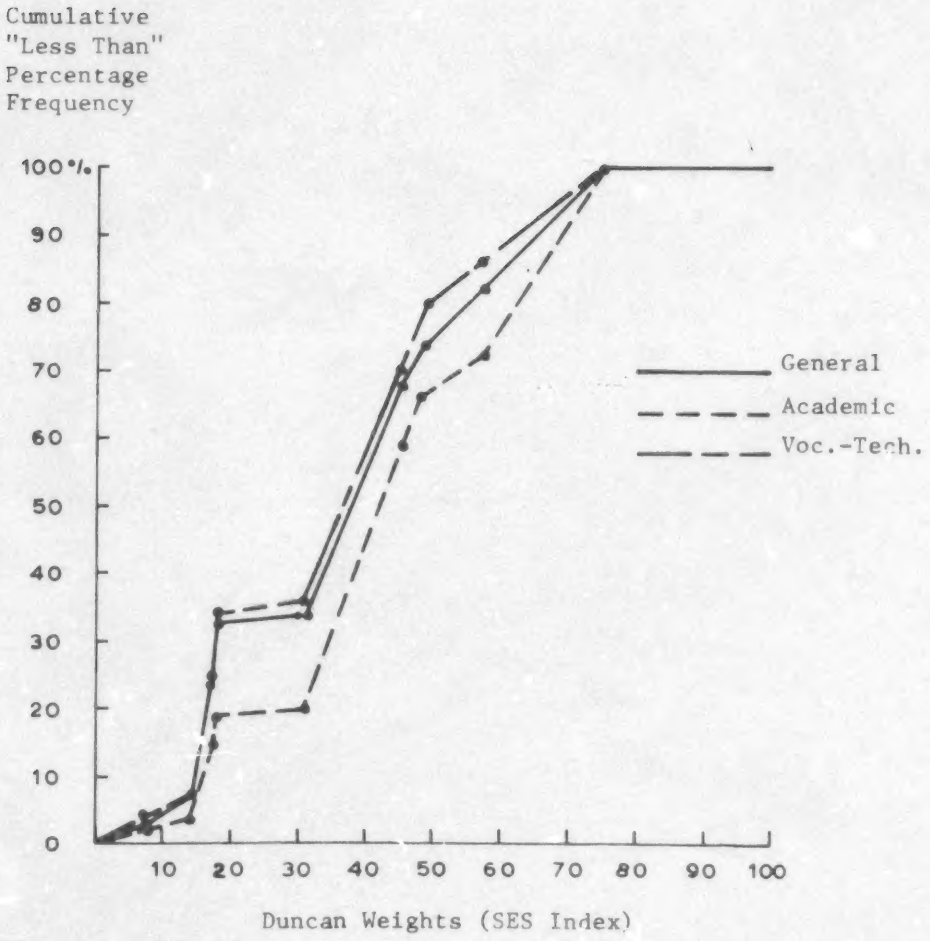


Figure 4-7

Duncan SES Index for Mother's Occupation
(by Curriculum)



to be overrepresented (7%) in the Service category and underrepresented in the Clerical (8%) and Homemaker (4%) categories.

The Duncan SES index reveals the same ordering of curricula by SES based upon mothers' occupations as was found in fathers' occupations, Academic students having the highest SES, Voc.-Tech. students having the lowest SES, and General students falling in between. The differences in median SES levels, as measured by mothers' occupations, are not so great as was found in fathers' occupations. The median SES index scores from mothers' occupation are 42 (Academic), 38 (General) and 37 (Voc.-Tech.). These medians have a range of only 5 points whereas the corresponding range based on fathers' occupations is 29 points.

PARENTAL EDUCATION

Validity of the Measures

Figure 4-8 is a replica of the NLS Student Questionnaire item which was used to obtain the parents' levels of education from students in the sample. During the validity study previously described this item was also answered by parents of selected sample students and the responses of parents compared to the corresponding responses of students. A summary of the results of that comparison appears in Table 4-5.

Results are similar in pattern to those obtained for parental occupation, with the non-response rate of students exceeding that of their parents. The parent-to-student agreement rate ranges from 75% for mothers who obtained a graduate degree to 13% for mothers who had attended an adult education program, and from 69% for fathers who finished high school to 18% for fathers who had attended a business or trade school. The overall rates of agreement, 50% for father's education and 55% for mother's education, like the individual agreement

Figure 4-8

Parental Education Items from Student Questionnaire SQ90

90. What was the highest educational level each of the following persons completed? If you are not sure, please give your best guess.

	(Circle one number in each column.)		
	Father or male guardian	Mother or female guardian	Oldest brother or sister
Doesn't apply	1	1	1
Did not complete high (secondary) school	2	2	2
Finished high school or equivalent	3	3	3
Adult education program	4	4	4
Business or trade school	5	5	5
Some college	6	6	6
Finished college (four years)	7	7	7
Attended graduate or professional school (for example, law or medical school), but did not attain a graduate or professional degree	8	8	8
Obtained a graduate or professional degree (for example, M.A., Ph.D., or M.D.)	9	9	9

Table 4-5

Validity Study

Percentage Frequency Distribution of Educational Levels of Parents

Fathers' Educational Level	Percentage Frequency From Parent	Percentage Frequency From Student	Parent Agreement
Does not apply	10.96	4.29	5
Less than High School	22.39	22.03	58
Finished High School	27.27	27.20	69
Adult Ed. Program	.85	.75	--
Business or Trade School	4.02	4.92	18
Some College	12.45	9.61	50
Finished 4 Years College	10.08	9.95	66
Attended Graduate School	2.76	4.44	25
Obtained Graduate Degree	5.99	4.84	55
No Response	3.23	11.97	--
Overall percent agreement			50%

Table 4-5 (continued)

Validity Study

Percentage Frequency Distribution of Educational Levels of Percents

Mothers' Educational Level	Percentage Frequency From Parent	Percentage Frequency From Student	Parent Agreement
Does not apply	4.01	1.76	--
Less than High School	21.74	16.51	52
Finished High School	38.52	37.44	72
Adult Ed. Program	2.05	1.93	13
Business or Trade School	6.97	5.89	35
Some College	14.51	12.08	51
Finished 4 Years College	5.31	6.54	70
Attended Graduate School	2.53	1.42	16
Obtained Graduate Degree	2.20	2.55	75
No Response	2.17	13.89	--
Overall percent agreement			55%

rates for separate levels for education, are seen to be small; however, the percentage frequency distribution produced by parents and by students are quite similar. Since we shall depend only upon frequency distributions for the discussion to follow, we may have some assurance of the validity of the results.

Fathers' Educational Level

The distributions of educational level for fathers are given in Table 4-6. Since the distribution produced by male students was highly similar to that produced by female students they are not shown. Figures 4-9 and 4-10 display percentage deviations of selected subgroups of students from the national (overall) distribution. Figure 4-9 for the three curricula and Figure 4-10 for Blacks and Whites.

These data suggest that fathers of General curriculum students are overrepresented in the categories having completed high school or less, and tend to be underrepresented in categories corresponding to college education. A similar effect may be noticed in Voc.-Tech. students except that the deviations from the national figures are greater. Academic students present somewhat the opposite effect, tending to have fathers with college training and tending less frequently than is usual to have fathers who had not completed high school.

The Black-White comparison of Figure 4-10 is dominated by the larger number of Whites in the population, but indicates strong tendencies for Black to have fathers with less than high school educations and to have relatively fewer fathers with college training. From Table 4-6 we may note that 46% of the nation's Black students have fathers who did not complete high school, nearly twice the figure for White students.

Table 4-6

Percentage Frequency Distribution of Father's Educational Level

Educational Level	General	Academic	Voc.-Tech.	White	Black	Overall
Does not Apply	3.47	1.21	4.54	2.00	9.42	2.61
Less than High School	33.11	18.69	41.90	26.45	46.46	28.10
Finished High School	31.91	29.49	34.69	31.83	26.19	31.37
Adult Ed. Program	1.56	1.02	1.10	1.16	1.59	1.19
Business or Trade School	5.42	6.46	4.00	5.69	4.61	5.60
Some College	10.94	13.70	7.15	11.90	6.03	11.42
Finished 4 Years College	8.35	15.37	3.99	11.50	2.69	10.77
Attended Grad. School	1.84	3.93	1.11	2.83	1.17	2.69
Obtained Grad. Degree	3.40	10.13	1.52	6.64	1.86	6.24

Source: National Longitudinal Study, Appendix B-II. Table B-388.

Figure 4-9

Percentage Deviations From The National Distribution
of Father's Educational Level
(by Curriculum)

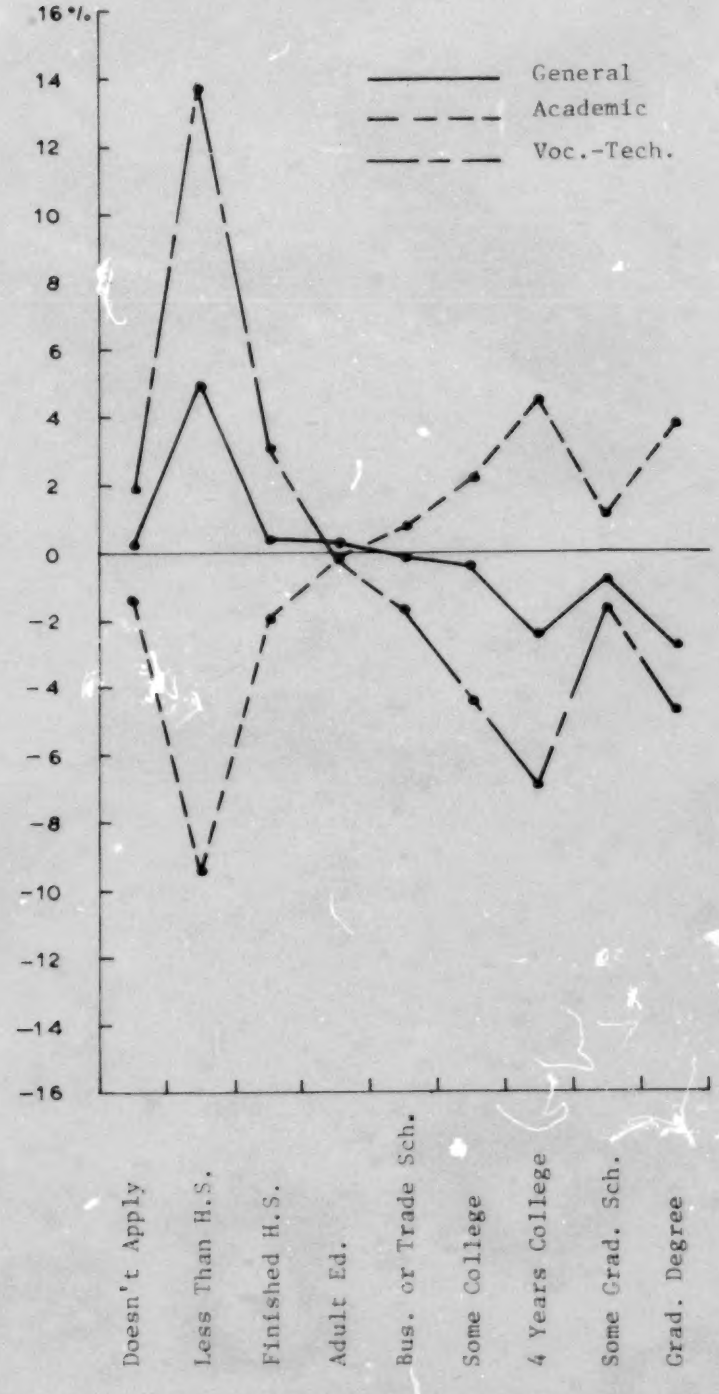
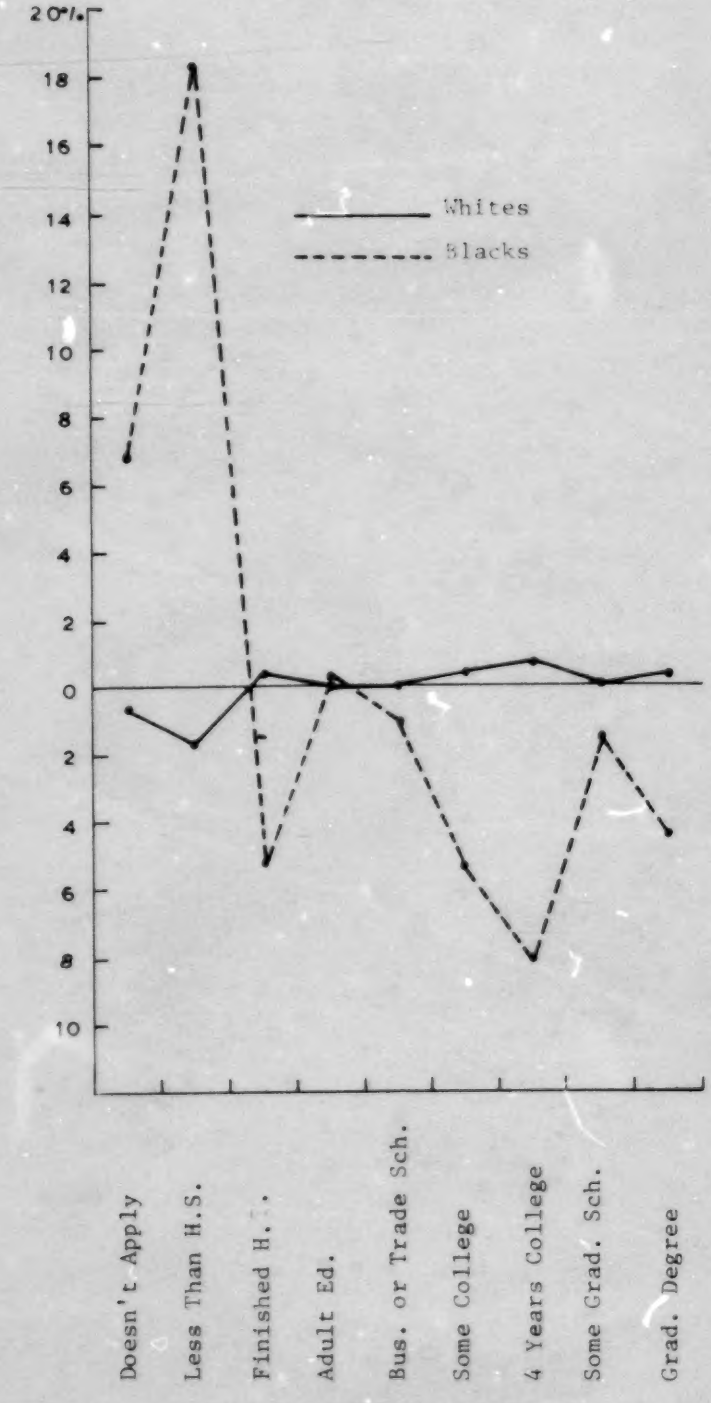


Figure 4-10

Percentage Deviations from The National Distribution
of Father's Educational Level
(by Curriculum)



Taken in toto, these facts point to the SES ordering observed earlier; namely, that the SES of Voc.-Tech. student is lower than that of General students who, in turn, are lower in SES than Academic students. As before, the SES level of Blacks is observably lower than that of Whites.

An alternative viewpoint may be obtained by scaling the educational levels of fathers. A set of criterion scale weights were generated for this purpose during the National Longitudinal Study through a factor analysis of 23 items in the Student Questionnaire which related to SES (4). Ogives of the percentage frequency distributions of fathers educational levels (as criterion scaled) are displayed in Figure 4-11 by curriculum.

Inspection of Figure 4-11 verifies the earlier findings regarding the ordering of the three curricula by SES.

Mothers' Educational Level

The percentage frequency distributions of levels of mothers' education are given in Table 4-7 for the three curricula, for Blacks and Whites, and for the national (overall) distribution. The distributions produced by male and female students were highly similar, with two small exceptions--the percentage of males who indicated their mothers' educational level to be less than high school was about 5% lower than the similar percentage produced by females, and about 5% more males than females indicated their mothers had finished four years of high school. No explanation has been found to account for this phenomenon. Apart from these small differences the frequency distributions produced by males and females were similar so that they are not reproduced below.

Figure 4-11

Cumulative Percentage Frequency Distributions of Criterion Scores for Father's Educational Level (by Curriculum)

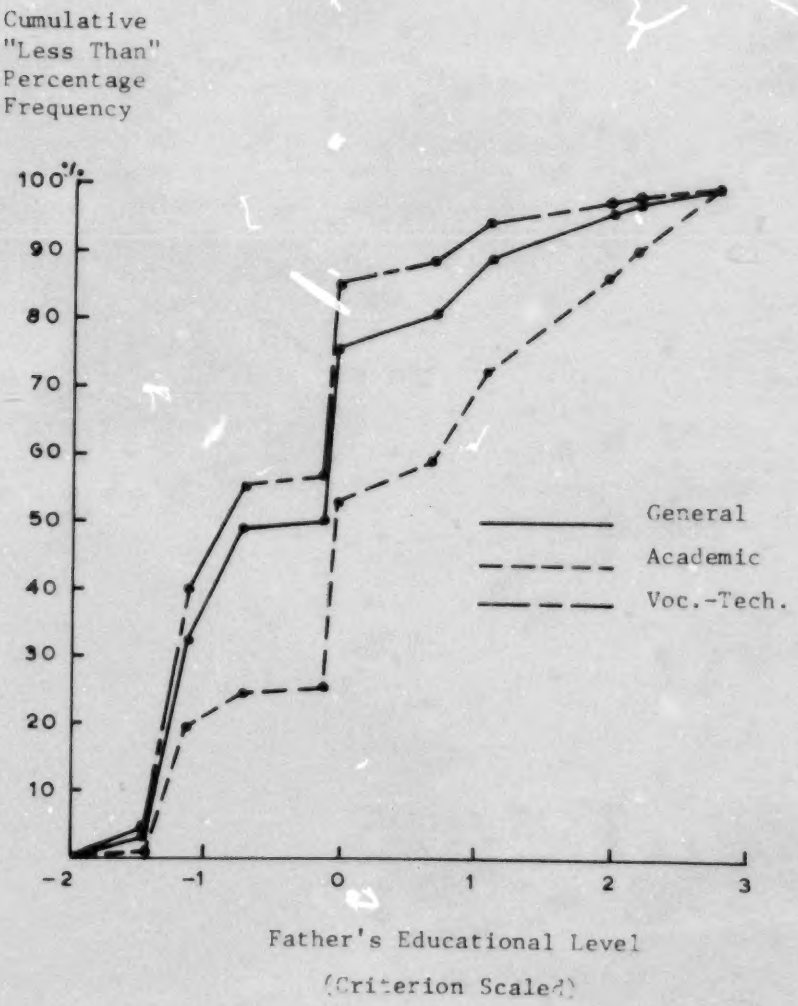


Table 4-6

Percentage Frequency Distribution of Mothers' Educational Level

Educational Level	General	Academic	Voc.-Tech.	White	Black	Overall
Does not Apply	2.22	.81	2.81	1.44	4.21	1.67
Less than High School	27.86	15.28	35.28	22.11	38.26	23.46
Finished High School	44.68	42.67	46.68	45.09	34.01	44.16
Adult Ed. Program	2.62	1.21	2.61	1.68	4.70	1.93
Business or Trade School	5.06	8.51	3.51	6.57	4.27	6.38
Some College	9.31	13.90	5.14	10.91	7.02	10.58
Finished 4 Years College	5.42	11.69	1.95	7.99	4.08	7.67
Attended Grad. School	1.40	2.31	1.13	1.85	.95	1.78
Obtained Grad. Degree	1.42	3.62	.89	2.35	2.50	2.37

Source: National Longitudinal Study, Appendix B-II, Table B-389.

Figures 4-12 and 4-13 show the percentage deviations from national averages of mothers' educational levels for curricula and race, respectively. In general these results parallel the previously presented results for fathers' educational level, although it appears that mothers' educational levels tend to deviate from the national levels slightly less than do those of fathers.

Criterion scaled educational level scores for mothers in each of the three curricula are shown in Figure 4-14. A careful comparison of Figure 4-11, corresponding to fathers' criterion scores, and Figure 4-14 indicates no appreciable differences between the two sets of data other than the reduced amount of variation already noted for mothers compared to fathers.

Thus, the SES implication of mothers' educational levels are similar to those of fathers, and the relative orderings of curricula and races by SES is the same as noted earlier.

Educational Press

During the National Longitudinal Study a set of 23 "status" variables were factor analyzed to produce a first varimax factor which has been titled "educational press"(5). Variables loading into this factor included friends' plans, career preferences, educational preferences, and the educational wishes of parents regarding the student. While not strictly an SES variable, we may nonetheless consider that the societal pressures visited upon the student in the direction of increased education might be a factor in the students' propensity to seek such additional education, and that such pressures might more frequently be found in upper SES homes than in lower ones.

Accordingly, the educational press variate has been displayed in Figure 4-15 (for curricula), Figure 4-16 (for Blacks and Whites), and Figure 4-17 (for males and females).

Figure 4-12

Percentage Deviations from The National Distribution of Mother's Educational Level (by Curriculum)

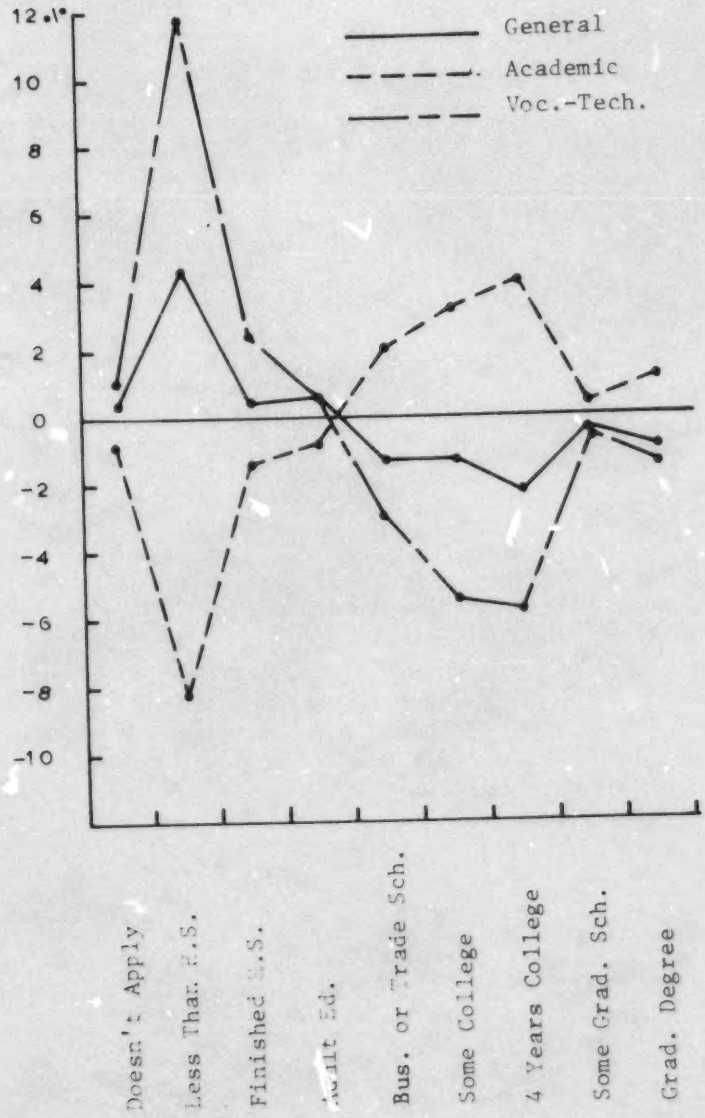


Figure 4-13

Percentage Deviations from The National Distribution
of Mother's Educational Level
(by Race)

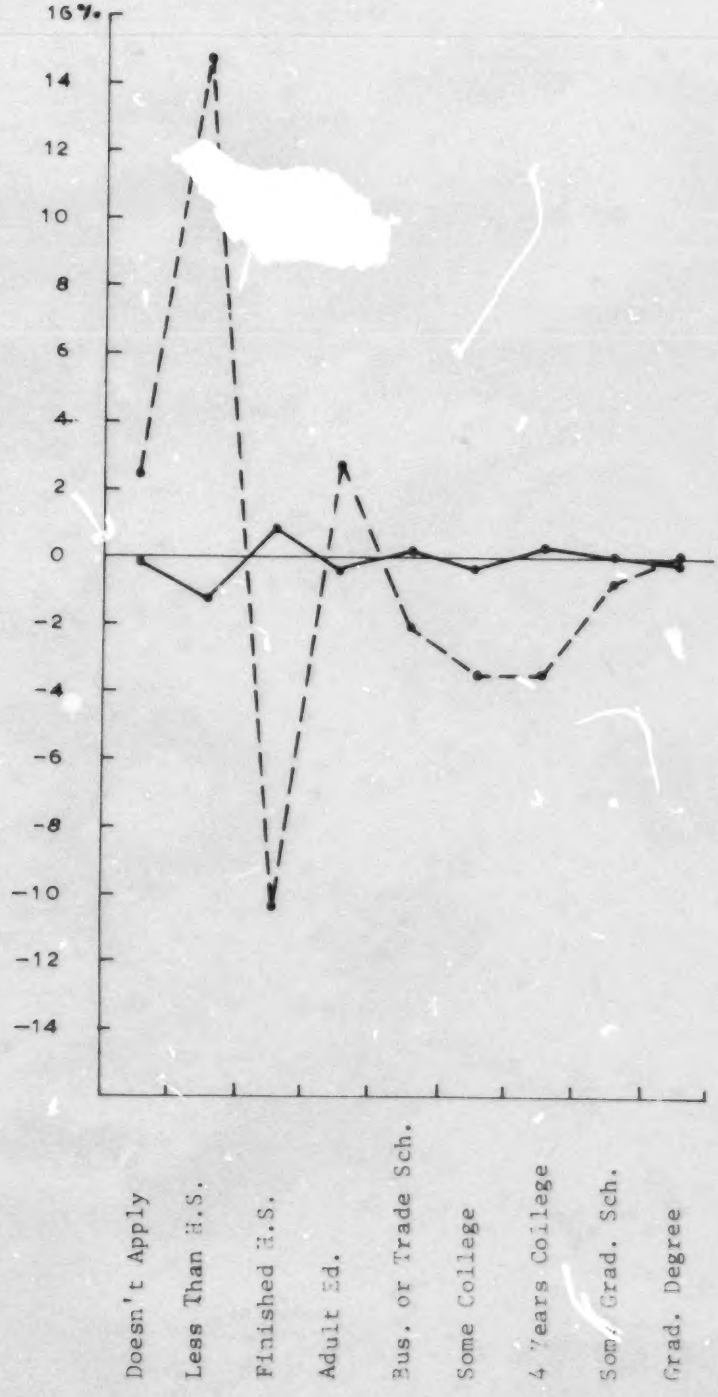


Figure 4-14

Cumulative Percentage Frequency Distributions of Criterion Scores for Mother's Educational Level (by Curriculum)

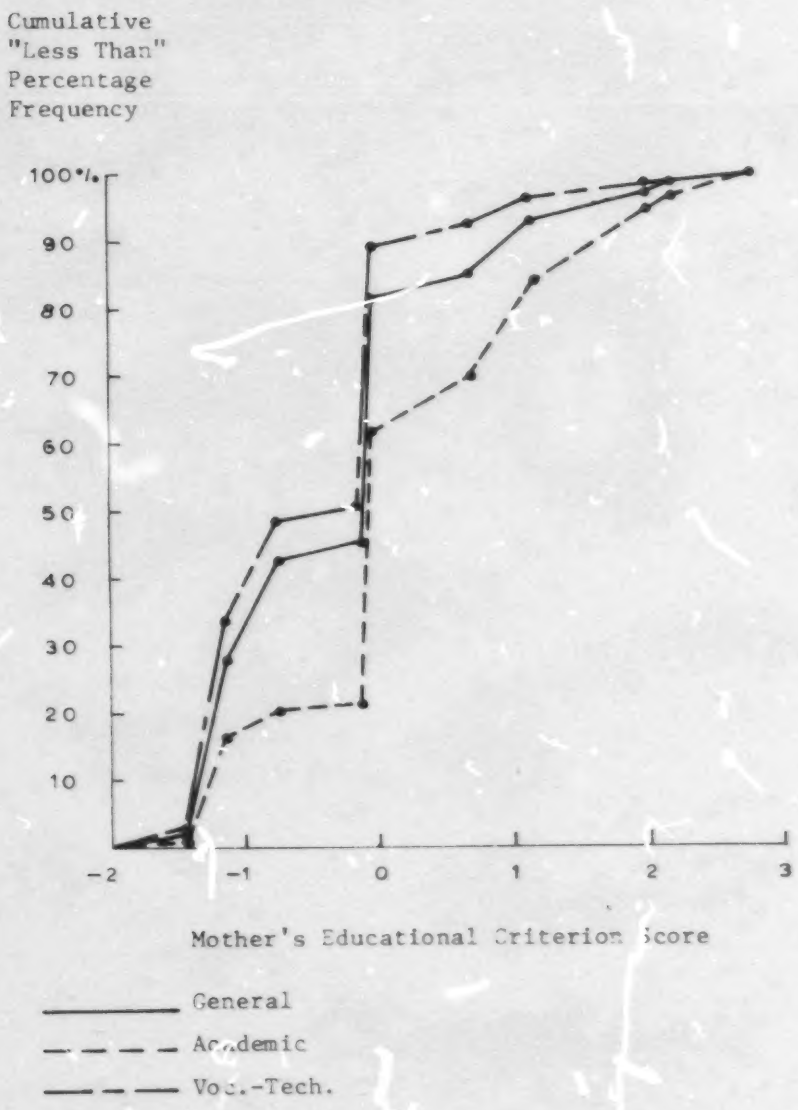
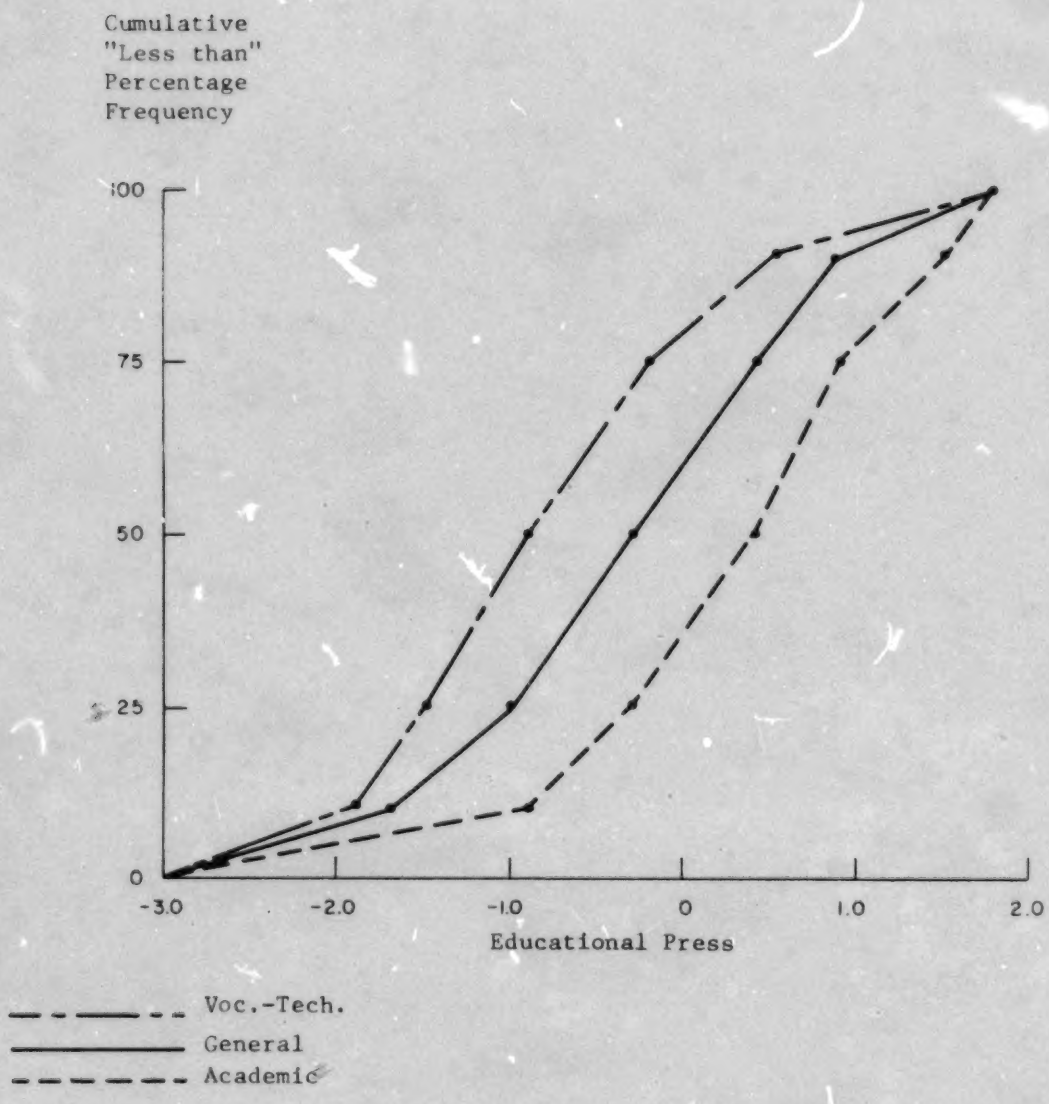


Table 4-15

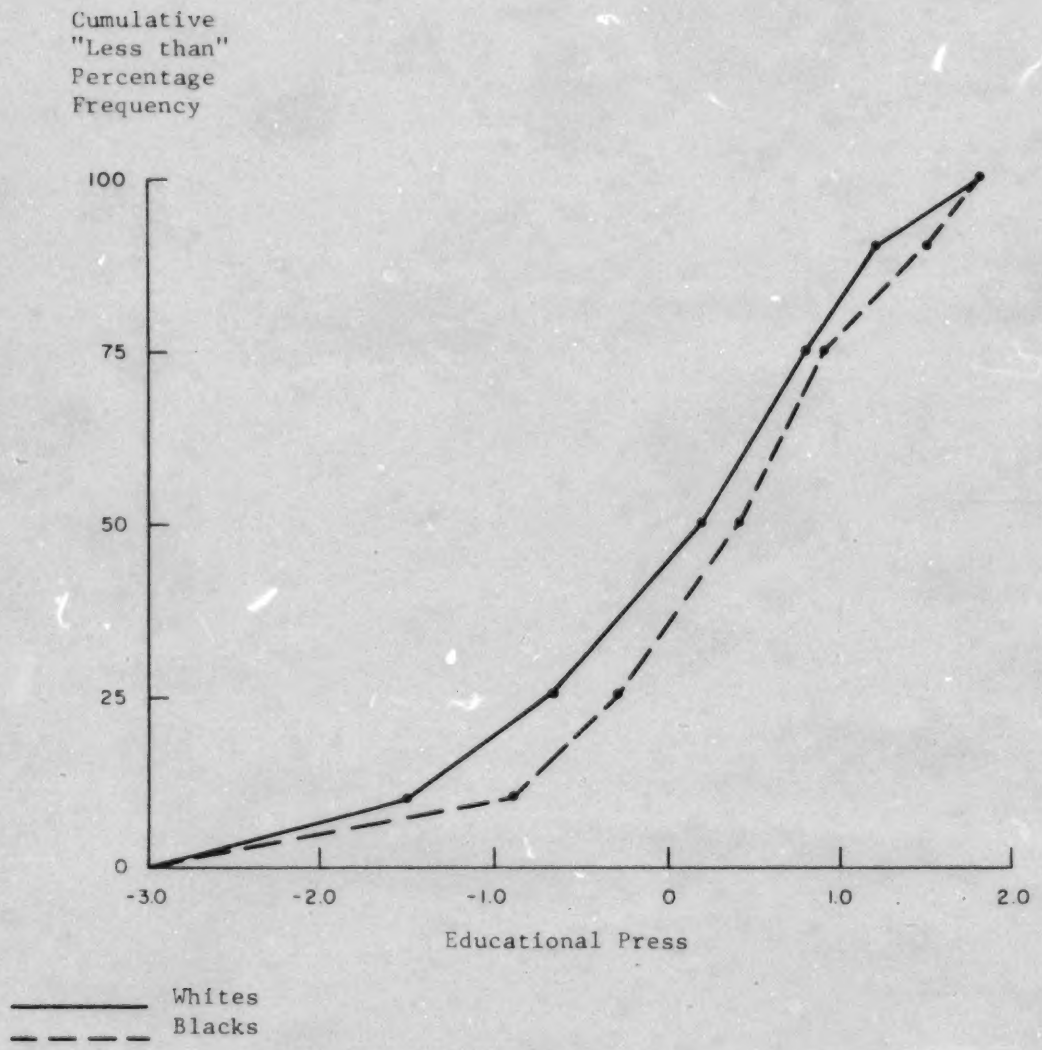
Educational Press, By Curricula



Source: National Longitudinal Study, Appendix D, Table D-315, pp. D-636 and D-637.

Figure 4-16

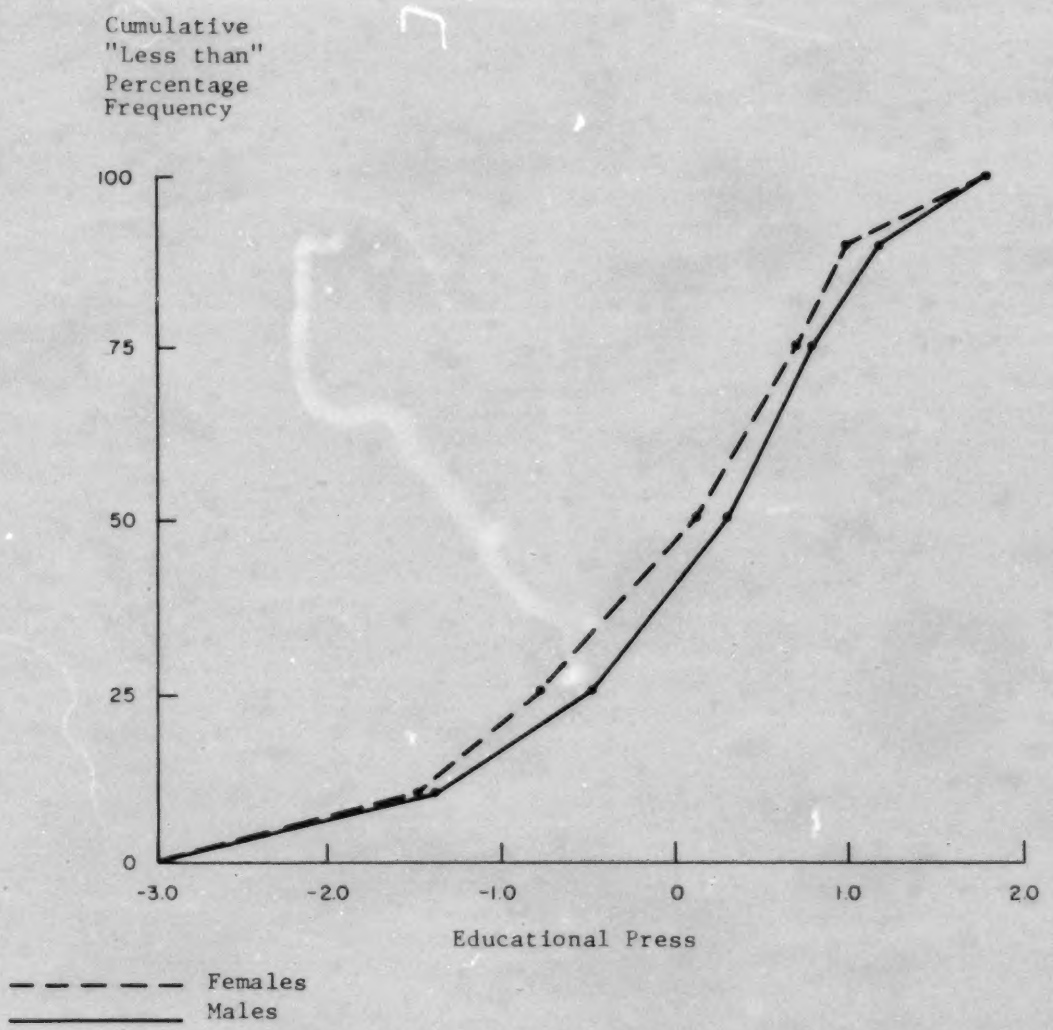
Educational Press, By Race



Source: National Longitudinal Study, Appendix D, Table D-315, pp. D-636 and D-637.

Figure 4-17

Educational Press, By Sex



Source: National Longitudinal Study, Appendix D, Table D-315, pp. D-636 and D-637.

Interpretation of the educational press variate must be undertaken with caution. Since educational press is a composite variate derived from several raw data, the problem of nonresponse bias is seriously enlarged. Overall, 35% of the students in the sample could not be used owing to missing data. In some partitions of the sample the situation was much worse. Nearly half of the General and Voc.-Tech. students were omitted, and 65% of the Black students were omitted. In view of these high rates of loss to the educational press variate one may reasonably wonder whether it can be meaningfully interpreted.

Observation of Figure 4-15 suggests that educational press is much greater for Academic students than for General students, whose educational press is, in turn, much greater than that of Voc.-Tech. students. The variate seems to produce a strong separation of the three curricula. In view of the previous SES ordering of curricula obtained through other variates such a result is reasonable. Figure 4-16, however, suggests that the educational press of Blacks is greater than that of Whites, a somewhat surprising result. About 44% of the White students and 35% of the Black students have educational press scores less than zero; the difference in these proportions is significant ($\chi^2 = 58.325$ with one degree of freedom, $p > .001$), hence it is unlikely that this result should be treated as spurious. Competing explanations for the finding could reasonably include the following: (a) the result may be due to nonresponse bias produced by the 65% nonresponding Black students--such an interpretation would be consistent with what is known of the direction of nonresponse bias; (b) the educational press factor may be invalid or unreliable--yet nothing improper was detected with the items used to produce the factor and the factor produced an internal consistency index (similar to Cronbach's Coefficient Alpha) of .73, which seems respectable; and (c) the factor may not be similarly defined for

Blacks and Whites--but evidence gathered during the National Longitudinal Study (6) suggests that while there may be a slight sex difference there is little reason to suppose a racial difference.

On balance, the possibility of higher educational press among Blacks than among Whites, must be admitted unless the high nonresponse rate of Blacks has tended to leave only those Blacks with high educational press in the usable portion of the sample.

Figure 4-17 indicates that males are significantly higher in educational press than are females ($p < .001$). This result, while not being surprising, serves as a proof that the educational press variate is not identical to SES, since theory would suggest that the SES levels of males and females should be the same.

INCOME

Validity of The Measures

Item 93 from the Student Questionnaire, which relates to family income, is reproduced in Figure 4-18. The validity of the item was investigated during the validity study by asking selected students and parents to respond to the item. Parents' responses were then matched with those of students and the degree of agreement between them computed. A summary of those results appears in Table 4-8. The overall rate of agreement, 29%, is undesirably low, and is appreciably lower than the corresponding agreement rates obtained earlier for parental occupation and education level. In those variates, however, the distributions produced by parents and students were highly similar. In the case of income this does not seem to be the case. Notable differences occur in the nonresponse rate (that of students being nearly four times that of parents), in

Figure 4-18

Student Questionnaire Item 93

93. What is the approximate income before taxes of your parents (or guardian)? Include taxable and non-taxable income from all sources.

(Circle one.)

Less than $3,000 a year (about $60 a week or less) 01

Between $3,000 and $5,999 a year (from $60 to $119 a week) 02

Between $6,000 and $7,499 a year (from $120 to $149 a week) 03

Between $7,500 and $8,999 a year (from $150 to $179 a week) 04

Between $9,000 and $10,499 a year (from $180 to $209 a week) 05

Between $10,500 and $11,999 a year (from $210 to $239 a week) 06

Between $12,000 and $13,499 a year (from $240 to $269 a week) 07

Between $13,500 and $14,999 a year (from $270 to $299 a week) 08

Between $15,000 and $18,000 a year (from $300 to $359 a week) 09

Over $18,000 a year (about $360 a week or more) 10

Table 4-8

Validity Study

Percentage Frequency Distributions of Family Income

Income (Dollars)	Percentage Freq. from Parents	Percentage Freq. from Students	Percent Agreement
Less than 3,000	3.18	5.64	73
3,000-5,999	11.05	8.89	49
6,000-7,499	8.14	7.67	20
7,500-8,999	9.34	8.81	29
9,000-10,499	10.82	10.31	18
10,500-11,999	5.52	9.17	25
12,000-13,499	8.92	9.39	40
13,500-14,999	7.80	6.53	11
15,000-18.000	15.52	5.23	15
Over 18,000	15.04	10.32	44
No Response	4.68	18.05	--
Overall rate of agreement			29%

Source: National Longitudinal Study, Appendix F, Table F-16, p. F-226.

the 4-1/2% difference between parents and students at the $10,500 - $11,999 income level, in the 10% difference at the $1 ,000 - $18,000 level, and in the 5% difference at the "Over $18,000" level.

In addition to these concerns, there is evidence of a sex-effect bias in the income reported by students. Females more frequently tend to report lower incomes than males, and males more frequently tend to report higher incomes than females. The magnitude of this effect may be observed in Table 4-9.

Before Taxes Parental Income

The income of parents is given in Table 4-9 for various partitions of the sample, and displayed graphically in the ogives of Figures 4-19 and 4-20.

Median family incomes were computed in the National Longitudinal Study (7) as follows:

Males	$11,242
Females	10,153
Whites	11,286
Blacks	5,987
General	9,922
Academic	12,404
Voc.-Tech	9,041

The SES ordering of the medians as well as the ogives is the same as those observed earlier; namely, that the SES level of Voc.-Tech. students tends to be somewhat less than that of General students who, in turn, tend to have a lower SES level than that of Academic students. Especially noteworthy is the $5,000 difference in median incomes of Blacks and Whites, a result which again demonstrates the lower SES position of Blacks.

Table 4-9

Percentage Frequency Distributions of Parental Income

Income (Dollars)	Males	Females	General	Academic	Voc.-Tech.	White	Black	Overall
Less than 3,000	4.53	6.24	7.92	2.30	8.08	3.03	25.13	5.34
3,000-5,999	8.91	11.89	12.43	6.56	15.13	8.60	24.98	10.31
6,000-7,499	9.38	12.13	11.63	7.89	15.07	10.33	13.68	10.68
7,500-8,999	10.11	9.75	10.58	8.84	11.33	9.85	10.77	9.94
9,000-10,499	11.95	13.03	12.18	11.58	14.60	12.87	8.92	12.46
10,500-11,999	10.26	9.29	9.74	9.99	9.50	10.32	5.36	9.80
12,000-13,499	9.80	9.28	8.47	10.38	9.30	10.26	3.57	9.[illegible]
13,500-14,999	7.84	6.61	7.29	8.78	4.15	7.88	1.90	7.26
15,000-18.000	10.03	8.37	8.31	11.52	5.88	10.02	2.65	9.25
Over 18,000	17.19	13.41	11.44	22.15	6.96	16.85	3.04	15.41

Source: National Longitudinal Study, Appendix B-II, Table B-394.

Figure 4-19

Distributions of Family Income

(by Curriculum)

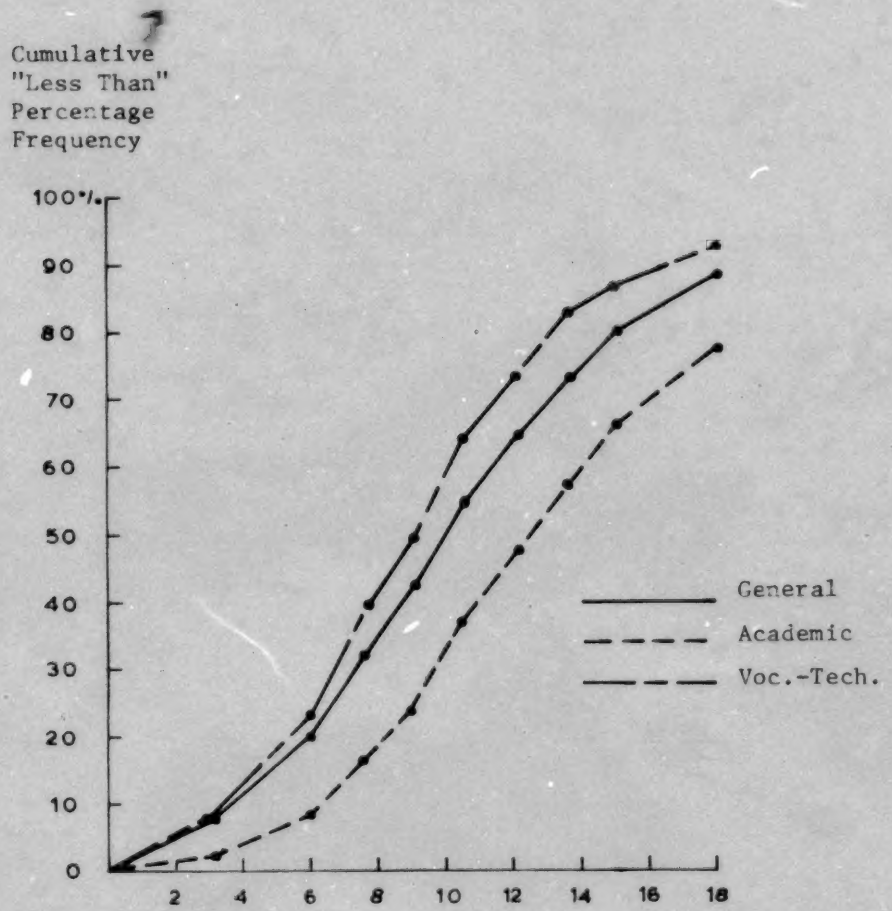
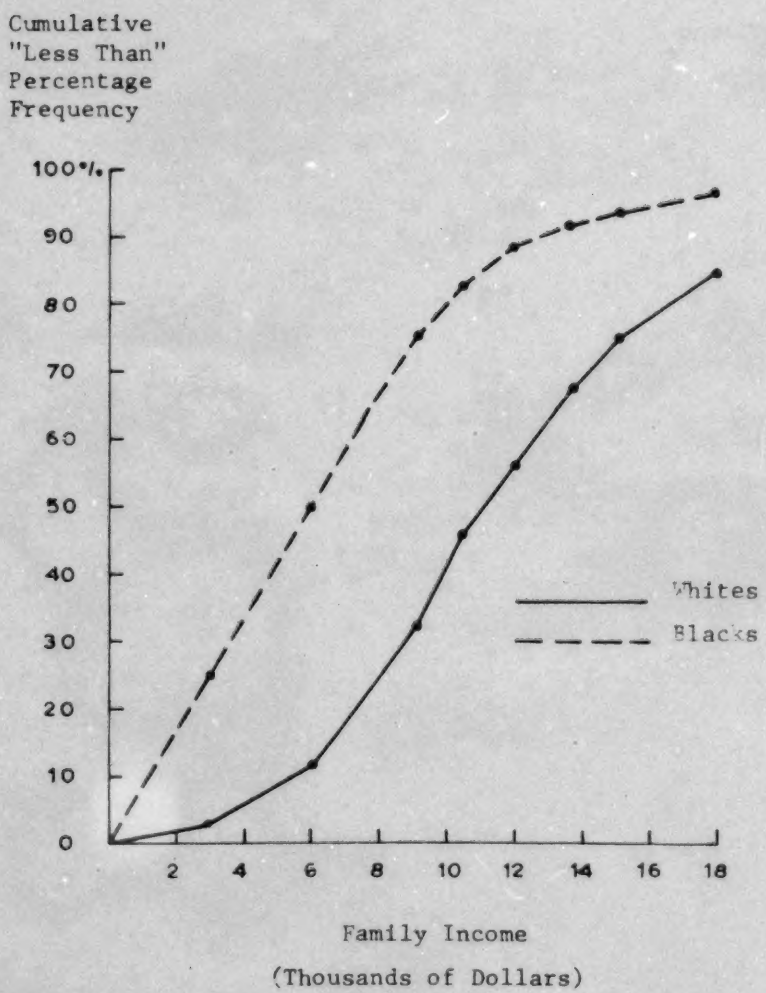


Figure 4-20

Distributions of Family Income

(by Race)



POSSESSIONS

Item 94 of the Student Questionnaire (Figure 4-21) asked students to indicate whether there were certain possessions within the home. The results are displayed in Table 4-10. Several aspects of this table are notable.

Sex differences can be found. Males tend more frequently to have a tape recorder in their home and to come from homes having a dishwasher or two or more cars. Females tend more frequently than males to come from homes where there is a typewriter. In consideration of the interests and cultural sex-role stereotypes of males, as opposed to those of females, these results seem reasonable.

Curriculum differences strongly suggest the SES advantage of Academic students over students in other curricula--there is no category in which the General or Voc.-Tech. student is more likely to have a given possession than the Academic student. The comparison of General and Voc.-Tech. students indicate a slight SES advantage of General students in the higher incidence of color televisions, dishwashers, and two or more automobiles in the home.

Racial differences are very strong, again indicating the SES disadvantage of Blacks compared to that of Whites.

COMPOSITE SES

It was mentioned earlier that a set of 23 status-related variables were submitted to a factor analysis and subsequent Varimax rotation. The first factor to result was the Educational Press factor discussed above. The second factor was a socioeconomic status factor. Factor scores of individuals on this factor provide a composite measure of SES. The factor is only moderately internally consistent. The measure of consistency (similar to Cronbach's

Figure 4-21

Student Questionnaire Item 94

94. Which of the following do you have in your home?

(Circle one number on each line.)

	Have	Do not have
A specific place for study	1	2
Daily newspaper	1	2
Dictionary	1	2
Encyclopedia or other reference books	1	2
Magazines	1	2
Record player	1	2
Tape recorder or cassette player	1	2
Color television	1	2
Typewriter	1	2
Electric dishwasher	1	2
Two or more cars or trucks that run	1	2

Table 4-10

Possessions of The Family

Percentage of Respondents Indicating The Presence of Possessions

	Males	Females	General	Academic	Voc.-Tech.	White	Black	Overall
Place to Study	64%	61	59	67	59	63	62	63
Newspaper	90	90	87	94	87	91	79	90
Dictionary	99	99	98	99	98	99	97	99
Encyclopedia	90	90	87	93	88	91	80	90
Magazines	93	93	92	94	91	93	88	93
Record Player	96	97	95	97	96	97	94	96
Tape Recorder	75	67	69	74	69	72	66	71
Color Television	64	61	62	65	58	65	44	63
Typewriter	79	84	75	88	78	84	61	82
Dishwasher	42	37	34	49	26	42	9	39
2 or more autos	80	73	77	77	72	79	47	76

Source: National Longitudinal Study, Appendix B-II, Tables B-395 through B-405.

Coefficient alpha was .58. Nonetheless, the structure of the factor was fairly uniform within each of the four sex x race partitions of the sample tested. Variables loading into the factor were parents occupations, educations, and income, presence of an electric dishwasher (missing for the factor in the case of Black males), presence of a typewriter (for Black males), and two or more cars (present for the total sample but not for the partition of the sample).

Factor scores were obtained and compared for males and females but no appreciable differences were noted. Partitions for curriculum and race (Figures 4-22 and 4-23, respectively) indicated SES differences similar to those observed earlier.

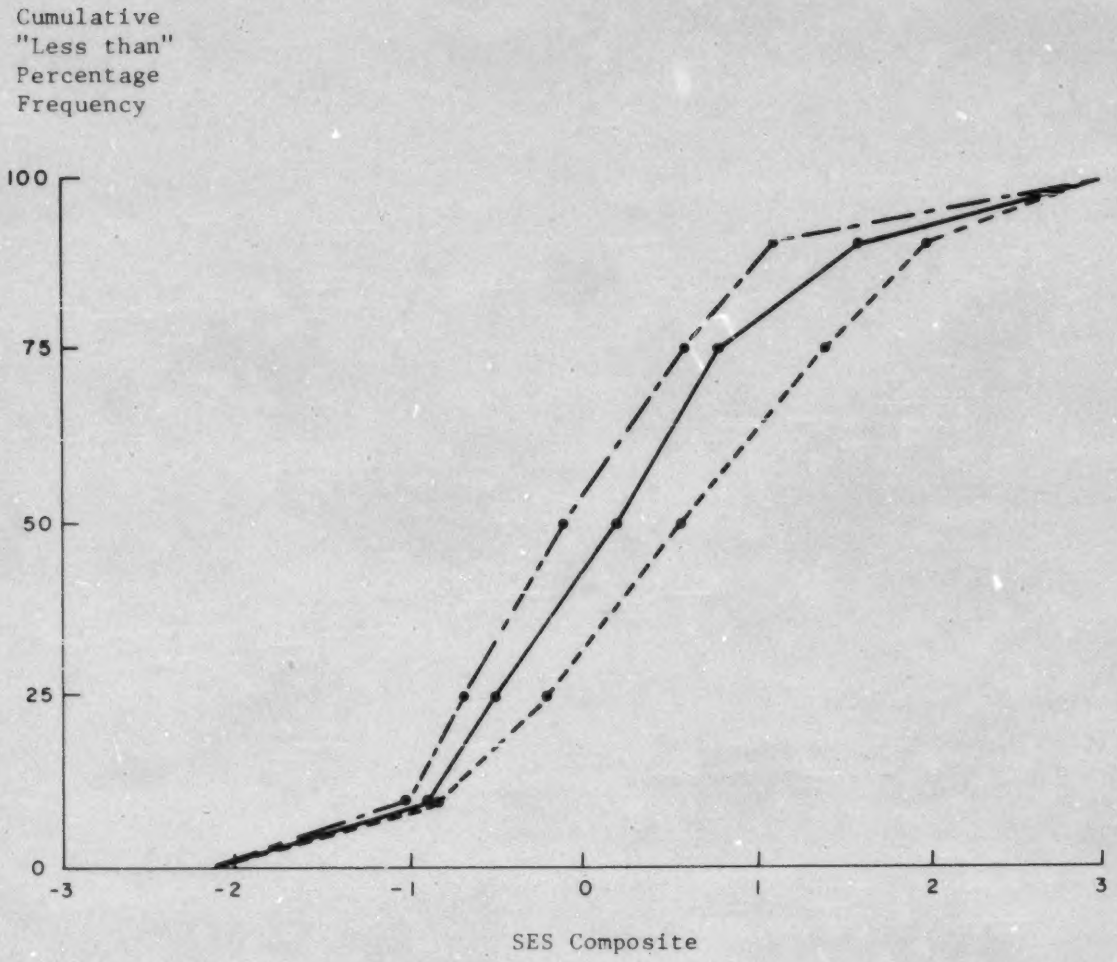
SUMMARY

The analyses presented above have evaluated the socioeconomic status (SES) of students in the high school class of 1972 through comparisons of curriculum and race. The concept of SES was approached through (a) status of parents' occupations, (b) educational levels of parents, (c) educational press on the student, (d) parental income, (e) home possessions, and (f) a composite measure of SES.

Results of the six separate analyses were highly similar, indicating that the SES level of the Academic student is superior to that of students in General and Voc.-Tech. curricula. In most instances Voc.-Tech. students were seen to be similar to General students, in the variables studied but slightly lower in SES. The SES of Black students was found to be markedly lower than that of White students.

Figure 4-22

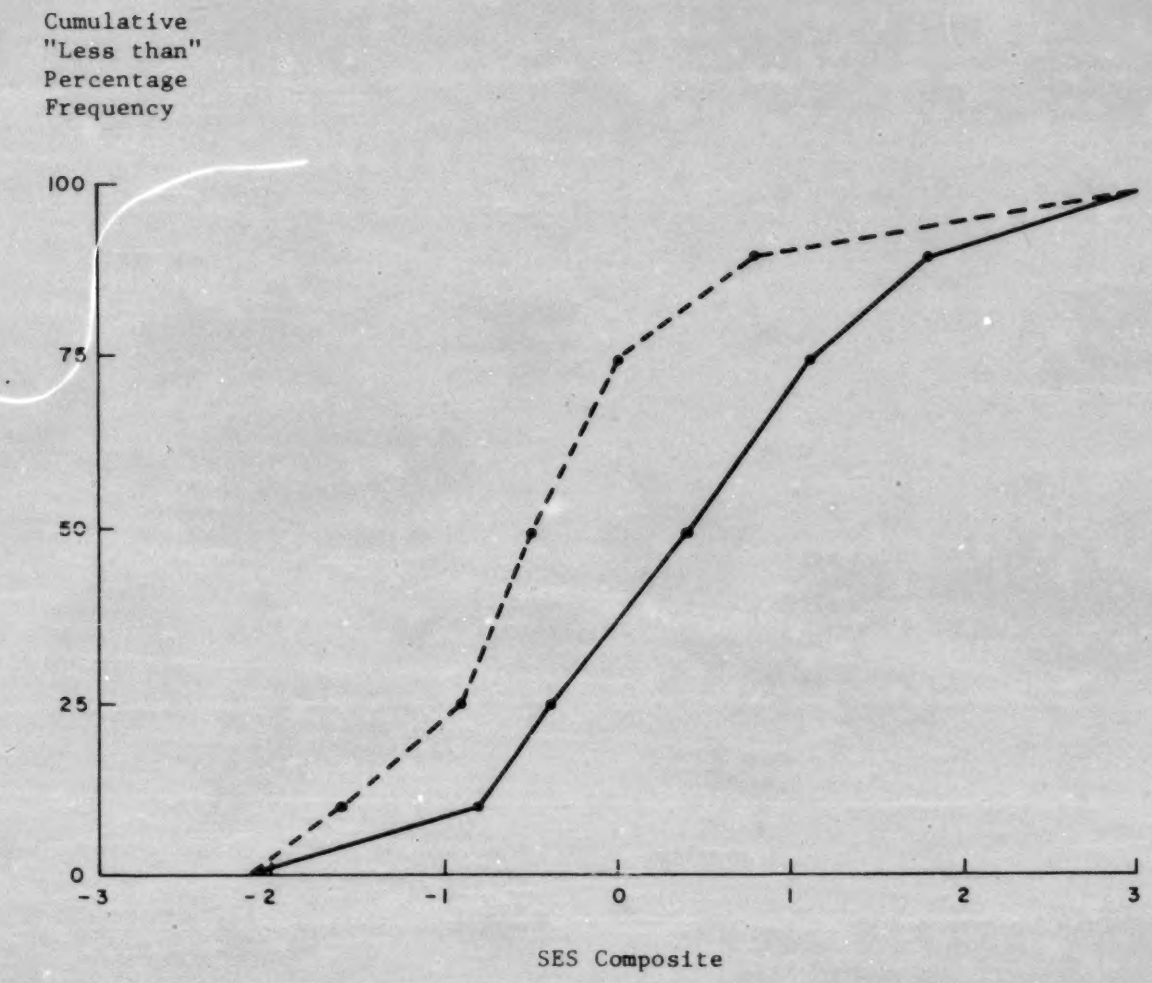
SES Composite Measure, By Curriculum



Source: National Longitudinal Study, Appendix D, Table D-316, pp. D-638 and D-639.

Figure 4-23

SES Composite Measure, By Race



Source: National Longitudinal Study, Appendix D, Table D-316, pp. D-638 and D-639.

Notes

1. Duncan, O. D., "A socioeconomic index for all occupations," in A. J. Reiss, Jr., O. D. Duncan, P. K. Hatt, and C. C. North (Eds.), Occupations and Social Status, New York: Free Press of Glencoe, 1961, pp. 109-138.

   The weights assigned to the occupational categories in the National Longitudinal Study are displayed in Table 5-12, p. 5-42 of the NLS Final Report.

2. Source: National Longitudinal Study Report, Appendix F, Table F-16, p. F-231.

3. Source: National Longitudinal Study Report, Appendix F, Table F-16, p. F-232.

4. The development of the criterion weights is more completely discussed in the NLS Final Report. See National Longitudinal Study Final Report, pp. 5-25 through 5-29.

5. A more detailed discussion may be found in National Longitudinal Study Final Report, pp. 5-38 through 5-47.

6. National Longitudinal Study Final Report, p. 5-45.

7 National Longitudinal Study Final Report, p. 6-15.

CHAPTER 5

PARTICIPATION IN FEDERAL PROGRAMS

INTRODUCTION

Students in the National Longitudinal Study were asked to indicate whether they participated in any of the following Federal educational programs:

- Cooperative Vocational Education Program (Co-op)
- High School Vocational Education Work-Study Program (Work-Study)
- Neighborhood Youth Corps (NYC)
- Talent Search
- Upward Bound

This chapter presents an exploration of some of the characteristics of students who indicated they had participated in the programs.

PARTICIPATION IN FEDERAL PROGRAMS

A summary of participation rates, by sex, curriculum, and race is provided in Table 5-1 which presents several interesting facts. The most salient fact is that the programs are not of equal size. The Work-Study program is largest, with an estimated 277,000 students enrolled in the program nationwide, a figure which represents roughly 10% of the high school class of 1972. Talent Search and Upward Bound are much smaller than the other federal programs, each enrolling fewer than 2% of the high school senior class.

Participation rates in the federal programs are similar for the two sexes, but differ appreciably between races and among curricula. Voc.-Tech. students were heavily enrolled in the Co-op program and in the Work-Study program (about 1/5 of all Voc.-Tech. students indicated enrollment in each program). In these same two federal programs general students were slightly

Table 5-1

Summary of Participation in Federal Programs
(Figures in Percentages Except as Noted)

	Program				
	Co-Op	Work-Study	NYC	Talent S.	Upward B.
Sex:					
Males	7.77%	10.18	6.03	1.68	.63
Females	7.21	9.73	7.06	1.47	.86
Curriculum:					
General	7.30	10.39	8.18	2.49	.79
Academic	2.51	3.26	4.46	1.09	.79
Voc.-Tech.	17.40	22.38	8.61	1.34	.60
Race:					
White	7.18	9.23	3.89	.96	.38
Black	10.30	16.74	31.07	7.31	4.10
Excluded classes	8.15	13.16	13.48	3.34	1.75
All Students:	7.62	10.34	7.19	1.76	.83
(Number)	204,136	276,783	191,015	46,735	22,083

less than half as likely to participate, and Academic students were about one-sixth as likely to participate.

The NYC program enrolled about 8% of the General and Voc.-Tech. students, and about 4% of the Academic students. The Talent Search and Upward Bound programs did not distinguish the students by curriculum--the rates of participation were fairly uniform across all three.

Blacks were proportionally more represented in all of these programs than Whites, and nearly a third of all Black respondents indicated participation in the Neighborhood Youth Corps. People of other ethnicities (shown as "excluded classes" in Table 5-1), while not present with the participation rates of Blacks, were still represented relatively more frequently than Whites. Owing to the numbers of Blacks, Whites, and others in the general population, we might expect most enrollees of the Co-op and Work-Study programs to be White, while the other programs would be roughly equal in numbers of Blacks and Whites.

The estimated enrollment in all federal programs, nationwide, should be approximately 741,000 students--about one-fourth of all high school seniors in 1972.

ACADEMIC PERFORMANCE OF FEDERAL PROGRAM PARTICIPANTS

In the main the students in federal programs do not report their grades as being appreciably different from those reported by nonparticipants. Work-Study students, however, from General and Academic curricula, reported receiving significantly lower grades than did nonparticipants in the same curricula ($p < .05$).

However, the composite measure of ability, developed by a factor analysis of several relevant variables in the National Longitudinal Study, indicates

that, compared to nonparticipating students in the same high school curriculum, federal program participants are more frequently above the median ability score. A summary of this effect is presented in Table 5-2.

Table 5-2

Chi-square (df=1) Results Comparing Ability Factor Scores of Federal Program Participants and Nonparticipants in the Same Curriculum

	Federal Program				
Curriculum	Co-op	Work-Study	NYC	Talent S.	Upward B.
General	13.41*, p<.001	35.32*, p<.001	40.83*, p<.001	10.35*, p<.001	9.37*, p<.01
Academic	14.00*, p<.001	33.57*, p<.001	94.68*, p<.001	12.44*, p<.001	12.21*, p<.001
Voc.-Tech.	4.49*, p<.05	16.03*, p<.001	15.48*, p<.001	8.54*, p<.01	N.S.

*The number of federal program students with ability factor scores above the median is greater than expected.

N.S. = p > .05 (Not Significant)

The picture thus presented is one in which preponderantly bright students do not receive preponderantly high grades. There are at least two reasons which might be advanced to account for the situation. First, that the students tend to be underachievers who fail to achieve at a level commensurate with their ability, or second, that they do not receive appropriate recognition for their performance. No available data bear directly on the issue.

Some indirect data are available, however, which would tend to support the first conjecture. Work-Study students in General and Voc.-Tech. curricula are less likely to do homework than their peers (Table 5-3). Work-Study students,

Table 5-3

Chi-square (df=2) Results Comparing The Likelihood of Doing Homework in Federal Program Participants and Nonparticipants in The Same Curriculum

	Federal Program				
Curriculum	Co-op	Work-Study	NYC	Talent S.	Upward B.
General	N.S.	14.09*, p<.005	7.92**, p<.05	N.S.	N.S.
Academic	N.S.	N.S.	11.13**, p<.005	N.S.	N.S.
Voc.-Tech.	N.S.	15.01*, p<.005	N.S.	N.S.	9.02**, p<.05

*The number of federal program students who do no homework is above that expected.

**The number of federal program students who do more than five hours of homework per week is above that expected.

N.S. = p > .05 (Not Significant)

regardless of curricula, are also more apt to spend 20 hours per week or more in employment than their peers (Table 5-4). Moreover, these students are more likely to complain that their job takes so much time that it interferes with school performance, a sentiment shared by Co-op students (Table 5-5). For these students we could therefore consider their scholastic performance to be lower than their potential would indicate owing to overly-demanding jobs.

This explanation is not wholly satisfactory since NYC students in General and Academic curricula report spending somewhat more time on their homework than their peers and the complaint of an over-demanding job is absent; nonetheless, their grades are insignificantly different from their peers while their ability level is elevated.

FEELINGS OF INTERFERENCE WITH SCHOOL

Participants in federal programs differed from their same-curriculum peers in a number of ways which related to perceived interferences with their schooling. Talent Search students from all curricula, and Academic students in all federal programs were more apt than their peers to indicate that teachers were not adequately helpful (Table 5-6). Poor teaching, however, was not generally a problem.

Transportation to school was more likely to be seen as a problem by NYC students from all curricula, by Talent Search students in General and Voc.-Tech. curricula, and by Upward Bound students in General and Academic curricula than by their like-curriculum peers (Table 5-7) although the reason why this should be so remains obscure.

Parents who were disinterested in the students' education were seen as a problem by Work-Study, NYC, and Talent Search students from all curricula,

Table 5-4

Chi-square (df=2) Results Comparing The Likelihood of Employment in Federal Program Participants and Nonparticipants in the Same Curriculum

	Federal Program				
Curriculum	Co-op	Work-Study	NYC	Talent S.	Upward B.
General	56.56*, $p<.005$	50.68*, $p<.005$	12.23***, $p<.005$	N.S.	N.S.
Academic	N.S.	66.03*, $p<.005$	N.S.	N.S.	6.90**, $p<.05$
Voc.-Tech.	N.S.	79.82*, $p<.005$	9.66**, $p<.01$	N.S.	N.S.

*The number of federal program students working more than 20 hours per week is greater than expected.

**The number of federal program students who do not work is greater than expected.

***The number of federal program students who work 20 hours or less per week is greater than expected.

N.S. = $p > .05$ (Not Significant)

Table 5-5

Chi-square (df=1) Results Comparing The Likelihood of The Complaint That Job Takes Too Much Time and Interferes With Schooling In Federal Program Participants and Nonparticipants In The Same Curriculum

	Federal Program				
Curriculum	Co-op	Work-Study	NYC	Talent S.	Upward B.
General	13.98*, $p<.005$	6.66*, $p<.001$	N.S.	N.S.	N.S.
Academic	15.36*, $p<.005$	14.93*, $p<.005$	N.S.	N.S.	N.S.
Voc.-Tech.	16.11*, $p<.005$	14.98*, $p<.005$	N.S.	N.S.	N.S.

*The number of federal program students with the complaint was greater than expected.

N.S. = $p > .05$ (Not Significant)

Table 5-6

Chi-square (df=1) Results Comparing The Likelihood of The Complaint That Teachers Were Not Sufficiently Helpful In Federal Program Participants and Nonparticipants In The Same Curriculum

	Federal Program				
Curriculum	Co-op	Work-Study	NYC	Talent S.	Upward B.
General	N.S.	N.S.	7.18*, $p<.01$	10.24*, $p<.005$	N.S.
Academic	12.26*, $p<.005$	4.99*, $p<.05$	9.99*, $p<.005$	4.48*, $p<.05$	20.55*, $p<.005$
Voc.-Tech.	N.S.	N.S.	N.S.	10.33*, $p<.005$	N.S.

*The number of federal program students with this complaint was greater than expected.

N.S. = $p > .05$ (Not Significant)

Table 5-7

Chi-square (df=1) Results Comparing The Likelihood of The Complaint That Transportation To School Is Difficult In Federal Program Participants and Nonparticipants In The Same Curriculum

	Federal Program				
Curriculum	Co-op	Work-Study	NYC	Talent S.	Upward B.
General	N.S.	N.S.	20.24*, $p<.005$	14.01*, $p<.005$	5.32*, $p<.05$
Academic	N.S.	N.S.	35.04*, $p<.005$	N.S.	7.79*, $p<.01$
Voc.-Tech.	N.S.	N.S.	19.72*, $p<.005$	5.87*, $p<.05$	N.S.

*The number of federal program students with the complaint was greater than expected.

N.S. = $p > .05$ (Not Significant)

by Co-op General students, and by Upward Bound students from Academic and Voc.-Tech. curricula (Table 5-8). In part this may reflect the attitudes of Black students who tend to be prone to this sentiment. It may also reflect the low educational level of the fathers of these students, a variable which is strongly related to perceived parental disinterest. Lack of a good place to study was a problem to NYC students, relative to their peers, and was also a problem to Work-Study students in Academic and Voc.-Tech. curricula and to Upward Bound students in General and Academic curricula (Table 5-9). Other personal and home problems included worry over money problems, family obligations (other than money), and problematic health--these being more frequently cited as problems by Work-Study and NYC students (of all curricular) than by their peers.

SCHOOL SERVICES AND FACILITIES

Evaluative statements by federal program students concerning the school, its facilities and its services were usually indistinguishable from the statements of their peers. Where these were differences the federal program students tended toward a favorable opinion, especially in terms of counseling services provided by the schools. Work-Study students from all curricula, and Co-op students from Academic and Voc.-Tech. curricula were more prone than their peers to indicate that the school offered a sufficient amount of practical work experience. NYC students from all curricula tended to feel that the school had provided counseling which would help them with the continuance of their education, which provided them with new ideas concerning the work they wanted to do, which provided personal and social insights, and which would help in finding employment. With somewhat less consistency, students in other federal programs tended to a similar view. The results of Table 5-10 are typical.

Table 5-8

Chi-square (df=1) Results Comparing The Likelihood of The Complaint That Parents Were Disinterested In The Students Education In Federal Program Participants and Nonparticipants In The Same Curriculum

	Federal Program				
Curriculum	Co-op	Work-Study	NYC	Talent S.	Upward B.
General	10.57*, p<.005	11.73*, p<.005	33.33*, p<.005	16.75*, p<.005	N.S.
Academic	N.S.	7.36*, p<.01	14.03*, p<.005	5.84*, p<.05	10.95*, p<.005
Voc.-Tech.	N.S.	5.26*, p<.05	9.54*, p<.005	7.46*, p<.01	10.82*, p<.005

*The number of federal program students with the complaint was greater than expected.

N.S. = p >.05 (Not Significant)

Table 5-9

Chi-square (df=1) Results Comparing The Likelihood of The Complaint That The Student Had No Good Plan To Study At Home In Federal Program Participants and Nonparticipants In The Same Curriculum

	Federal Program				
Curriculum	Co-op	Work-Study	NYC	Talent S.	Upward B.
General	N.S.	N.S.	11.60*, p<.005	N.S.	7.64*, p<.01
Academic	N.S.	10.92*, p<.005	13.13*, p<.005	N.S.	5.49*, p<.05
Voc.-Tech.	N.S.	4.61*, p<.05	10.30*, p<.005	N.S.	N.S.

*The number of federal program students with this complaint was greater than expected.

N.S. = p > .05 (Not Significant)

Table 5-10

Chi-square (df=1) Results Comparing The Likelihood of The Provision of Counseling Which Provided Personal and Social Insights In Federal Program Participants and Nonparticipants In The Same Curriculum

	Federal Program				
Curriculum	Co-op	Work-Study	NYC	Talent S.	Upward B.
General	N.S.	10.03*, $p<.005$	30.83*, $p<.005$	5.07*, $p<.05$	N.S.
Academic	N.S.	11.23*, $p<.005$	18.00*, $p<.005$	N.S.	N.S.
Voc.-Tech.	4.80*, $p<.05$	N.S.	4.70*, $p<.05$	N.S.	N.S.

*The number of federal program students provided this form of counseling was greater than that expected.

N.S. = $p > .05$ (Not Significant)

School facilities were somewhat less favorably viewed. NYC students (all curricula), Upward Bound students (General and Academic), and Talent Search (General) students indicated the condition of buildings and classrooms was substandard (Table 5-11). On the other hand, Co-op and Work-Study students in the Voc.-Tech. curriculum tended more than their peers to evaluate the equipment used in vocational education courses as good-to-excellent, and students in these two programs (from all curricula) tended to evaluate the quality of vocational instructions as good-to-excellent.

EXTRACURRICULAR ACTIVITIES

An analysis was conducted to compare federal program participants with nonparticipants regarding the likelihood of their participation in various extracurricular activities. As before the comparison group was formed of nonparticipants from the same curriculum. The item from which the information was drawn is displayed in Figure 5-1.

The results of this analysis are presented in Table 5-12 which rather clearly shows a tendency for NYC, Talent Search, and Upward Bound students to engage in extracurricular activities at least as frequently as their nonparticipant peers. Talent Search students in General and Voc.-Tech. curricula are more likely to participate in every listed form of extracurricular activity than their peers.

For Co-op and Work Study students the picture is somewhat different. Apart from subject matter clubs (e.g., science club, physics club, math club., etc.) and vocational education clubs (future Homemakers, Teachers, Farmers of America, etc.), these students participate in extracurricular activities at the same rate as their peers, or at a lower rate.

The patterns of participation of federal program students from General and Voc.-Tech. curricula tend to be roughly similar, and somewhat different

Table 5-11

Chi-square (df=1) Results Comparing The Likelihood That The Condition of Classrooms and Buildings Would Be Judged Sub-Standard In Federal Program Participants and Nonparticipants In The Same Curriculum

	Federal Program				
Curriculum	Co-op	Work-Study	NYC	Talent S.	Upward B.
General	N.S.	N.S.	14.45*, $p<.005$	5.45*, $p<.05$	3.93*, $p<.05$
Academic	N.S.	N.S.	17.11*, $p<.005$	N.S.	12.52*, $p<.005$
Voc.-Tech.	4.69**, $p<.05$	N.S.	5.51*, $p<.05$	N.S.	N.S.

*The number of federal program students judging these facilities to be poor or fair was greater than expected.

**The number of federal program students judging these facilities to be good or excellent was greater than expected.

N.S. = $p > .05$ (Not Significant)

Figure 5-1

Student Questionnaire Item 10

10. Have you participated in any of the following types of activities, either in or out of school this year?

(Circle one number on each line.)

	Have not participated	Have participated actively	Have participated as a leader or officer
Athletic teams, intramurals, letterman's club, sports club	1	2	3
Cheerleaders, pep club, majorettes	1	2	3
Debating, drama, band, chorus	1	2	3
Hobby clubs such as photography, model building, hot rod, electronics, crafts	1	2	3
Honorary clubs such as Beta Club or National Honor Society	1	2	3
School newspaper, magazine, yearbook, annual	1	2	3
School subject matter clubs such as science, history, language, business, art	1	2	3
Student council, student government, political club	1	2	3
Vocational education clubs such as Future Homemakers, Teachers, Farmers of America, DECA, OEA, FBLA, or VICA	1	2	3

Table 5-12

Chi-square (df=1) Results Comparing Proportions of Federal Program Participants In Extracurricular Activities with Nonparticipants In The Same Curriculum

	Co-op	Work-Study	General NYC	Talent S.	Upward B.
Athletic Clubs	5.96-	7.52-	8.56+	10.05+	
Cheerleaders	6.57-		4.36+	7.95+	
Debate, Drama	8.15-	11.48-	42.92+	53.35+	11.33+
Hobby Clubs				15.89+	
Honor Clubs				3.89+	
School Newspaper			7.25+	12.11+	
Subject matter Club		7.41+	26.21+	79.23+	
Student Politics	10.88-		3.99+	35.05+	23.88+
Voc. Ed. Clubs	70.92+	64.37+	8.76+	18.46+	

Notes:

1. Values tabled are computed Chi-square values. Values of 3.84 or less, corresponding to p-values greater than .05, are not shown.
2. A minus sign indicates proportionally fewer federal program participants than nonparticipants in the activity; a plus sign indicates proportionally more federal program participants than nonparticipants.
3. P-values for the results given are as follows:

   $\chi^2 > 3.84$, $p < .05$

   $\chi^2 > 6.63$, $p < .01$

   $\chi^2 > 7.88$, $p < .005$

Table 5-12 (cont'd)

Chi-square (df=1) Results Comparing Proportions of Federal Program Participants In Extracurricular Activities with Nonparticipants In The Same Curriculum

	Co-op	Work-Study	Academic NYC	Talent S.	Upward B.
Athletic Clubs		3.89-			
Cheerleaders			6.93+	4.47+	8.96+
Debate, Drama	4.56-	19.05-		17.56+	
Hobby Clubs			18.02+	19.03+	30.33+
Honor Clubs	10.47-	4.75-			
School Newspaper	6.07-	7.89-			
Subject Matter Club	3.99+			13.70+	
Student Politics					5.18+
Voc. Ed. Clubs	61.97+	36.01+	36.69+	7.45+	5.62+

Notes:

1. Values tabled are computed Chi-square values. Values of 3.84 or less, corresponding to p-values greater than .05, are not shown.
2. A minus sign indicates proportionally fewer federal program participants than nonparticipants in the activity; a plus size indicates proportionally more federal program participants than nonparticipants.
3. P-values for the results given are as follows:

   $\chi^2 > 3.84$, $p < .05$

   $\chi^2 > 6.63$, $p < .01$

   $\chi^2 > 7.88$, $p < .005$

Table 5-12 (cont'd)

Chi-square (df=1) Results Comparing Proportions of Federal Program Participants In Extracurricular Activities with Nonparticipants In The Same Curriculum

	Co-op	Work-Study	Voc.-Tech. NYC	Talent S.	Upward B.
Athletic Clubs		10.08-	5.49+	19.81+	10.68+
Cheerleaders	7.25-			11.51+	
Debate, Drama		3.88-		62.20+	13.94+
Hobby Clubs				16.94+	4.11+
Honor Clubs			4.34+	16.27+	4.94+
School Newspaper	6.53-		10.33+	22.36+	
Subject Matter Club	4.99+		22.23+	29.03+	17.06+
Student Politics			21.53+	15.59+	15.77+
Voc. Ed. Clubs	128.15+	98.53+		9.65+	8.40+

Notes:

1. Values tabled are computed Chi-square values. Values of 3.84 or less, corresponding to p-values greater than .05, are not shown.
2. A minus sign indicates proportionally fewer federal program participants than nonparticipants in the activity; a plus sign indicates proportionally more federal program participants than nonparticipants.
3. P-values for the results given are as follows:

   $\chi^2 > 3.84$, $p < .05$

   $\chi^2 > 6.63$, $p < .01$

   $\chi^2 > 7.88$, $p < .005$

from that of Academic students. The nature of this difference is that federal program Academic students tend to be more similar to their peers (i.e., there are fewer significant differences between Academic federal program participants and their peers) than do federal program participants from General and Voc.-Tech. curricula (who tend to have more significant differences).

The participation rates of federal program students and their peers in each extracurricular activity are presented in Tables 5-13, 5-14, 5-15. for General, Academic and Voc.-Tech. students respectively. From these tables it appears that the participation rates of Academic students in extracurricular activities tend to be somewhat greater than those of General and Voc.-Tech. students. The high level of their extracurricular participation, regardless of their participation in federal programs, may partly account for the lack of differences noted above in the comparison of federal program Academic students and their peers.

SUMMARY

The analysis presented above compared students in federal educational programs with similar students (in the same curriculum) who were not in the federal programs. Students in these programs comprised about one-fourth of all high school seniors in 1972. Voc.-Tech. students tend more heavily than students in other curricula to participate in the Co-op program, the Work-Study program, and the Neighborhood Youth Corps program. There was a tendency for Blacks to be overrepresented in these programs relative to their proportion in the senior class as a whole.

Participants in federal programs tend to have more than their share of high-ability students, though their grades do not seem to reflect it. No adequate explanation seems to be available.

Table 5-13

Participation Rates of Federal Program Participants and Nonparticipants in Extracurricular Activities (General Curriculum Students)

	Co-op	Non-Co-op	Work-Study	Non Work-Study	NYC	Non-NYC	T.S.	Non-T.S.	U.B.	Non-U.B.
Athletic Clubs	.359*	.427*	.368	.429	.483	.416	.554	.421	.389	.424
Cheerleaders	.104	.156	.131	.156	.186	.151	.236	.150	.178	.153
Debate, Drama	.248	.323	.254	.325	.450	.308	.600	.311	.531	.318
Hobby Clubs	.227	.191	.181	.196	.190	.195	.325	.191	.269	.194
Honor Clubs	.044	.066	.057	.066	.064	.065	.104	.063	.058	.064
School Newspaper	.142	.172	.197	.166	.213	.166	.278	.167	.237	.170
Subject Matter Clubs	.240	.221	.268	.217	.313	.214	.527	.213	.286	.222
Student Politics	.086	.152	.141	.149	.179	.146	.323	.144	.385	.148
Voc. Educa. Clubs	.421	.220	.370	.217	.285	.227	.382	.228	.285	.232

*To illustrate interpretation: Referring only to General Curriculum students, 35.9% of those in the Co-op program were also in athletic clubs; this compares to 42.7% of non-Co-op General students.

Table 5-14

Participation Rates of Federal Program Participants and Nonparticipants in Extracurricular Activities (Academic Curriculum Students)

	Co-op	Non-Co-op	Work-Study	Non Work-Study	NYC	Non-NYC	T.S.	Non-T.S.	U.B.	Non-U.B.
Athletic Clubs	.513*	.525	.463	.527	.526	.525	.613	.524	.404	.526
Cheerleaders	.240	.192	.197	.193	.244	.190	.273	.192	.344	.191
Debate, Drama	.310	.389	.253	.391	.429	.384	.582	.384	.390	.386
Hobby Clubs	.195	.174	.209	.173	.255	.171	.334	.173	.443	.172
Honor Clubs	.144	.250	.188	.249	.216	.248	.256	.247	.215	.247
School Newspaper	.171	.252	.174	.253	.257	.250	.319	.249	.353	.249
Subject Matter Clubs	.359	.290	.342	.290	.334	.289	.451	.288	.291	.290
Student Politics	.223	.264	.261	.263	.303	.262	.343	.262	.392	.262
Voc. Educa. Clubs	.346	.137	.273	.137	.246	.136	.231	.139	.247	.140

*See note, Table 5-13 for explanation.

Table 5-15

Participation Rates of Federal Program Participants and Nonparticipants in Extracurricular Activities (Vocational-Technical Curriculum Students)

	Co-op	Non-Co-op	Work-Study	Non-Work-Study	NYC	Non-NYC	T.S.	Non-T.S.	U.B.	Non-U.B.
Athletic Clubs	.320*	.317	.273	.330	.369	.312	.563	.313	.577	.315
Cheerleaders	.115	.155	.127	.153	.178	.147	.293	.147	.220	.148
Debate, Drama	.202	.213	.187	.218	.249	.208	.594	.205	.473	.210
Hobby Clubs	.211	.184	.206	.184	.197	.190	.382	.187	.326	.189
Honor Clubs	.069	.065	.064	.065	.090	.063	.185	.064	.160	.065
School Newspaper	.117	.155	.135	.153	.204	.144	.348	.145	.181	.149
Subject Matter Clubs	.256	.217	.230	.222	.318	.215	.490	.219	.519	.222
Student Politics	.113	.117	.131	.112	.187	.109	.267	.114	.333	.114
Voc. Educa. Clubs	.551	.323	.505	.321	.401	.357	.538	.358	.600	.360

*See note, Table 5-13 for explanation.

Compared to their same-curriculum peers (nonparticipants) several groups of federal program participants were more likely to feel that teachers were not adequately helpful, that transportation to school was difficult, that parents were disinterested in their education, that counseling services offered by the schools were generally good, teaching was generally of adequate quality, but that school facilities were substandard.

CHAPTER 6

SPECIAL TEACHING TECHNIQUES

INTRODUCTION

Item 4 of the Student Questionnaire (Figure 6-1) asked the students to indicate how frequently they had been exposed to each of eight different techniques or modalities of instruction. Clearly, the import of such an item lies in the determination of over- or under-emphases in the use of such techniques on certain kinds of students. Item 4, however, does not address itself to the actual application of these techniques, but rather determines the perceptions of students regarding the subjective dimension of frequency with which the techniques were perceived. This is a regrettable loss to the attempt to discover the appropriateness of application rates of various teaching techniques. One may also consider that students might not be the best source of information regarding the applications of such techniques.

Additionally, it seems likely that certain techniques might be more valuably applied to certain courses of instruction, or to certain kinds of students. Criteria for such an evaluation are completely missing so we are constrained in the sequel to a limited evaluation of students' perceptions of the frequency with which selected techniques were applied.

Each technique was examined through the medium of a 3-way contingency analysis, coupled with the relevant marginal 2-way contingency analyses. The three dimensions involved were sex, curriculum, and frequency of application of the teaching technique. Testing was conducted by Chi-square using cell frequencies adjusted for the sample design.

Figure 6-1

Student Questionnaire Item 4

4. How often has each of the following been used in the courses you are taking this year?

(Circle one number on each line.)

	Never	Seldom	Fairly often	Frequently
Listening to the teacher's lecture	1	2	3	4
Participating in student-centered discussions	1	2	3	4
Working on a project or in a laboratory	1	2	3	4
Writing essays, themes, poetry, or stories	1	2	3	4
Going on field trips	1	2	3	4
Having individualized instruction (small groups or one-to-one with a teacher)	1	2	3	4
Using teaching machines or computer-assisted instruction	1	2	3	4
Watching television lectures	1	2	3	4

TEACHERS LECTURES

The percentages of the population of students in each cell of the 2 X 3 X 4 contingency table are shown in Table 6-1, together with the signed contributions to Chi-square. The Chi-square value, with 6 degrees of freedom, was 457.91 which would be quite significant ($p<.001$). The marginal test of sex and frequency was also significant ($X^2 = 68.13$, $p<.001$) and indicates a sex difference in response to this item. The sex difference can be detected only in the "fairly often" (slightly over endorsed by males compared to females) and the "frequently" (slightly over endorsed by females relative to males) categories. In part, this effect may arise from the fact that slightly more males are to be found in General curricula, while females are slightly more frequently found in Voc.-Tech. curricula.

By combining the sexes the curriculum frequency marginal also proves to be significant (Chi-square = 290.50, $p<.001$). Academic students tend not to endorse the "seldom" and "never" categories and to over-endorse the "frequently" category. Voc.-Tech. students tend to over-endorse the "seldom" and "never" categories, and not to endorse the "frequently" category. No appreciable effect is produced by General students or by perturbations in the "fairly often" category.

Analysis of the 3-way contingency table suggests that teachers lectures are more frequently encountered by Academic students than others and that Voc.-Tech. students tend less than others to receive such instruction.

However significant are such effects, their magnitudes must be fairly small since the percentage distribution of responses are reasonably similar across the six groups of students and suggest that teachers lectures are fairly often or frequently received by the students.

Table 6-1

Teachers Lectures

Percentages for Three-Way Contingency

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	.3%	2.9	7.3	6.5
	Academic	.1	2.8	9.1	9.7
	Voc.-Tech.	.3	2.2	4.7	3.8
Female	General	.2	2.3	5.8	6.6
	Academic	.2	2.4	7.5	11.5
	Voc.-Tech.	.3	2.9	5.4	5.3

Signed Contributions to Chi-Square

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	10	13	19	- 2*
	Academic	-18	-10	7	2
	Voc.-Tech.	12	15	- 4	-86
Female	General	--	- 3	-11	- 2
	Academic	-12	-55	-23	64
	Voc.-Tech.	9	67	12	--

* Minus sign indicates observed frequency was less than that expected.

STUDENT-CENTERED DISCUSSIONS

The percentages of students to be found in each cell of the 3-way contingency test, and the corresponding signed contributions to Chi-square for the perceived frequency with which students encounter student-centered discussions are shown in Table 6-2. The 3-way Chi-square obtained was 527.40 ($p<.001$).

The sex x frequency test was also significant ($X^2= 136.25$, $p<.001$), and indicates a surplus of males who responded to the "Seldom" and "Never" categories and a deficit of males in the "Frequently" category. The pattern for females was the inverse of that for males. One may speculate that the difference accrues to differences in courses taken by males and females.

The 2-way test of curriculum x frequency was also significant ($X^2 = 274.56$, $p<.001$). The relationship to be observed did not incorporate General students. Academic students to endorse the "Fairly Often" and "Frequently" categories and Voc.-Tech. students to endorse the low frequency categories.

Analysis of the 3-way contingency table adds little to the discussion other than to suggests that male General students may be patterned similarly to Voc.-Tech. students, and to suggest that the sex difference is largely due to high frequency endorsements of Academic females.

The percentage allocations of students to the cells of Table 6-2 suggest that the effects noted above are fairly small. Student-centered discussions, on the whole, are encountered with middling frequency--somewhere between the "Seldom" and "Fairly Often" categories.

Table 6-2

Student-Centered Discussions

Percentages for Three-Way Contingency

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	1.1%	6.7	6.4	2.6
	Academic	.8	7.9	9.2	3.8
	Voc.-Tech.	1.1	4.5	3.9	1.3
Female	General	.9	5.2	6.1	2.8
	Academic	.5	6.0	9.7	5.3
	Voc.-Tech.	.8	5.2	5.4	2.5

Signed Contributions to Chi-Square

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	19	33	--	- 7*
	Academic	-23	4	4	--
	Voc.-Tech.	78	--	-47	-53
Female	General	--	- 8	- 2	- 3
	Academic	-55	-71	10	67
	Voc.-Tech.	9	27	2	4

*Minus sign indicates observed frequency was less than that expected.

STUDENT PROJECTS AND LABORATORY WORK

Table 6-3 displays the percentage distributions of students into the cells of the 3-way contingency test and the signed contributions of Chi-square for the frequencies with which students encountered projects and laboratory work. The 3-way Chi-square obtained was 986.84 ($p<.001$).

The test for a sex x frequency relationship proved to be insignificant, but the curriculum x frequency test produced a highly significant Chi-square of 808.57 ($p<.001$). Differences are to be observed in all curricula. General students tend to endorse the two lowest frequency categories while Voc.-Tech. students tend to endorse the "Never" category. Academic students tend to avoid the "Never" category and to endorse the "Fairly Often" category.

The 3-way contingency analysis further refines this result by pointing out a large number of Voc.-Tech. females who endorse the "Never" category and a few Academic females who endorse the "Frequently" category. Similar effects do not seem to maintain for males in corresponding curricula.

The different patterns of response may be observed in the percentages of Table 6-3. The percentages show a general similarity of pattern within curricula, but somewhat different patterns from one curriculum to another.

STUDENT COMPOSITION WRITING

The frequencies with which students reported the writing of essays, themes, poetry or stories are depicted in the percentages of Table 6-4. The 3-way contingency test produced a Chi-square value of 837.61 ($p<.001$).

Predictably, the sex x frequency test attained a significant Chi-square ($X^2 = 180.22, p<.001$), indicating that females "frequently" tended to write compositions while males were more prone to indicate they "seldom" did.

Table 6-3

Student Projects and Laboratory Work

Percentages for Three-Way Contingency

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	4.2%	6.2	4.1	2.3
	Academic	2.4	7.5	8.1	3.7
	Voc.-Tech.	2.9	3.1	2.4	2.6
Female	General	3.7	5.5	3.6	2.1
	Academic	2.0	6.8	8.1	4.7
	Voc.-Tech.	3.8	4.7	3.3	2.1

Signed Contributions to Chi-Square

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	78	28	-10*	-18
	Academic	-92	2	71	--
	Voc.-Tech.	16	-47	-78	19
Female	General	21	--	-38	-29
	Academic	-173	-13	57	35
	Voc.-Tech.	145	8	- 6	--

*Minus sign indicates observed frequency was less than expected.

Table 6-4

Student Composition Writing

Percentages for Three-Way Contingency

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	1.5%	5.6	6.1	3.7
	Academic	.9	5.9	9.3	5.6
	Voc.-Tech.	1.6	4.0	3.4	1.9
Female	General	1.3	4.3	4.8	4.5
	Academic	.8	4.3	8.2	8.3
	Voc.-Tech.	1.5	4.2	4.7	3.5

Signed Contributions to Chi-Square

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	14	42	2	- 13*
	Academic	- 62	--	40	- 1
	Voc.-Tech.	102	6	- 39	-119
Female	General	3	- 1	- 25	--
	Academic	- 83	- 86	--	125
	Voc.-Tech.	48	23	--	2

*Minus sign indicates observed frequency was less than expected.

The curriculum x frequency test was also significant (X^2 = 544.75, $p<.001$). The relationship contrasted General and Voc.-Tech. students with Academic students. The former tended "Seldom" or "Never" to write compositions while the latter "Fairly Often" or "Frequently" did.

The 3-way analysis reveals that Academic females are more prone to "Frequently" write compositions, as compared to Academic males who tend to write compositions "Fairly Often." In General and Voc.-Tech. curricula the tendency toward low frequency involvement in composition writing seems to be more pronounced in males than in females. The percentages of Table 6-4 suggest that the effects are fairly pronounced.

FIELD TRIPS

The frequencies with which students reported the incidence of field trips are given in Table 6-5. The 3-way contingency test of sex x curriculum x frequency was significant (X^2 = 261.61, $p<.001$).

A sex effect may be noted (X^2 = 66.92, $p<.001$) in which females were prone to indicate they "Fairly Often" went on Field trips while males were prone to indicate that they "Never" did.

Collapsing across sexes, the curriculum x frequency analysis (X^2 =89.62, $p<.001$) indicates a trend across curricula with General students tending to mark the "Never" category while Academic students tend to mark "Seldom" and Voc.-Tech. students tend to mark "Fairly Often" or "Frequently."

The 3-way analysis suggests several refinements to this pattern. The sex difference is seen to be generated largely by males in General and Academic curricula who indicate they "Never" go on field trips. Voc.-Tech. males tend to avoid the "Never" and "Seldom" categories. While the pattern for females

Table 6-5

Field Trips

Percentages for Three-Way Contingency

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	8.1%	7.0	1.3	.4
	Academic	10.4	9.8	1.2	.3
	Voc.-Tech.	4.7	4.6	1.2	.4
Female	General	6.7	6.2	1.6	.5
	Academic	8.6	10.5	2.0	.4
	Voc.-Tech.	6.0	6.0	1.5	.5

Signed Contributions to Chi-Square

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	30	--	- 1*	--
	Academic	16	1	-43	-11
	Voc.-Tech.	-19	-25	2	8
Female	General	- 7	-12	2	2
	Academic	-20	8	2	- 5
	Voc.-Tech.	4	10	26	8

*Minus sign indicates observed frequency was less than expected.

is somewhat vague it tends, in a general way, to be the opposite of that established for males.

As the percentage allocations of Table 6-5 show, field trips are low frequency events and differences in patterning among sexes and curricula, while significant, are nonetheless small.

INDIVIDUALIZED INSTRUCTION

The percentages of students indicating various frequencies of individualized instruction are shown in Table 6-6 for the 3-way contingency test which was significant ($X^2 = 186.48$, $p<.001$), as were the sex x frequency test ($X^2 = 26.57$, $p<.001$), and the curriculum x frequency test ($X^2 = 62.21$, $p<.001$).

The sex x frequency test indicates that females are more prone than males to endorse the two high frequency categories. The curriculum x frequency test indicates a trend between curriculum and frequency with General students more prone than others to mark "Never," Academic students more likely to mark "Seldom," and Voc.-Tech. students more apt to mark the two high frequency categories. Neither the sex effect nor the curriculum effect are powerful, as may be seen in the comparatively small Chi-square values developed by these tests.

The 3-way contingency analysis presents a more complicated view of these effects. General and Academic males tend to indicate they received low frequency applications of individualized instruction. Voc.-Tech males and General and Academic females tended not to mark those categories, and Voc.-Tech. females tended to indicate they received individualized instruction fairly often. The percentages in Table 6-6 emphasize the fact that the

Table 6-6

Individualized Instruction

Percentages for Three-Way Contingency

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	6.1%	7.1	2.7	1.0
	Academic	7.2	10.2	3.5	1.0
	Voc.-Tech.	3.5	4.3	2.2	.9
Female	General	4.9	6.1	2.9	1.1
	Academic	6.2	10.0	4.0	1.4
	Voc.-Tech.	4.4	5.8	2.6	1.0

Signed Contributions to Chi-Square

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	27	2	--	--
	Academic	1	15	- 7*	-16
	Voc.-Tech.	-11	-31	--	4
Female	General	- 2	-23	1	1
	Academic	-12	2	--	--
	Voc.-Tech.	5	5	16	6

* Minus sign indicates observed frequency was less than expected.

incidence of individualized instruction, as examined by Chi-square, are tested in relation to frequencies in other cells. Actual percentages of responses differ in pattern from the Chi-square deviations and suggest that individualized instruction is seldom employed.

TEACHING MACHINES AND COMPUTER-ASSISTED INSTRUCTION

The frequencies reported by students for the perceived use of teaching machines and computer-assisted instruction (C.A.I.) are shown in Table 6-7 in terms of percentages and Chi-square contributions for the 3-way contingency test of sex x curriculum x frequency. The resulting Chi-square value was 900.97 ($p<.001$) for the 3-way test.

The tests for association between sex and perceived frequency of application of this teaching technique ($X^2 = 197.99$, $p<.001$) and between curriculum and perceived frequency ($X^2 = 439.06$, $p<.001$) were also significant. The sex x frequency analysis indicates more females who fairly often or frequently were exposed to teaching machines or computer-assisted instruction, and more males who were never so exposed. The relationship found in the curriculum x frequency analysis was for General students never to receive this instructional technique, for Academic students never or seldom to receive it, and for Voc.-Tech. students to receive it fairly often or frequently.

The 3-way contingency analysis discloses the important fact that Vocational-Technical females are responsible for approximately 70% of the 3-way effect; this group overlays the sex and curriculum effects noted above and is remarkable in its high endorsement of the "Fairly Often" and "Frequently" categories. To a much smaller degree, General curriculum females follow the same pattern, but the pattern of all other groups tends to reflect unusually low frequencies of application of these techniques.

Table 6-7

Teaching Machines and Computer-Assisted Instruction

Percentages for Three-Way Contingency

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	12.5	2.9	.9	.5
	Academic	15.7	4.3	1.3	.5
	Voc.-Tech.	7.8	1.8	.8	.5
Female	General	10.2	2.5	1.4	.9
	Academic	15.2	4.4	1.4	.5
	Voc.-Tech.	7.4	2.6	2.0	1.8

Signed Contributions to Chi-Square

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	45	- 1*	-16	-11
	Academic	11	4	-15	-44
	Voc.-Tech.	-12	-13	- 5	- 1
Female	General	- 9	-16	2	4
	Academic	--	11	- 7	-40
	Voc.-Tech.	-22	4	201	409

*Minus sign indicates observed frequency was less than expected.

TELEVISION LECTURES

The frequencies with which television lectures are seen by students as applied to them are provided in Table 6-8. One will immediately note that 76% of the students indicated they never saw television lectures, and another 18% indicated they seldom saw them. The 3-way contingency test was significant (X^2 = 182.73, $p<.001$) in spite of the strong right skew of the distribution of application frequencies, as was the curriculum x frequency test (X^2 = 71.77, $p<.001$). The sex x frequency test, however, was not significant.

About half of the effect noted in the curriculum x frequency test came from an overabundance of Academic students in the "Never" category and a corresponding lack of students in the top three frequency levels. The remainder of the effect came from a slight overabundance of General students who fairly often or frequently saw television lectures or from a slight surplus of Voc.-Tech. students who seldom did. The effect is a weak one and is not complicated by the 3-way analysis.

SUMMARY

Significant differences were found in the frequency with which students of various curricula reported their exposure to different teaching techniques. Such curriculum differences were found in every teaching technique examined.

Sex differences were generally found, also, excepting only (1) student projects and laboratory work and (2) television lectures. It was speculated that sex differences might accrue to the different courses elected by females and males and/or to the comparative interests in and facility with verbal concepts which females enjoy relative to males.

Table 6-8

Television Lectures

Percentages for Three-Way Contingency

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	12.5%	3.3	.8	.3
	Academic	17.0	3.7	.8	.2
	Voc.-Tech.	8.0	2.1	.6	.2
Female	General	10.8	2.8	1.0	.4
	Academic	17.3	3.4	.7	.2
	Voc.-Tech.	10.3	2.7	.6	.3

Signed Contributions to Chi-Square

		Frequency of Application			
		Never	Seldom	Fairly Often	Frequently
Male	General	5	11	--	--
	Academic	4	--	- 2*	- 4
	Voc.-Tech.	-34	--	--	- 1
Female	General	-26	--	13	14
	Academic	3	-16	-11	- 5
	Voc.-Tech.	14	16	2	3

*Minus sign indicates observed frequency was less than expected.

A simplified summary of the results is schematized in Figure 6-2. The heights of the columns of Figure 6-2 represent the proportion of the total student population (cross-classified by sex and curriculum) who indicated they "Never" or "Seldom" were exposed to the special teaching techniques. The taller the column, the less the technique is applied. A plus sign atop a column indicates an appreciable number of students in excess of that expected by chance under the 3-way contingency test; that is, students of that sex and curriculum were more likely than chance would suggest never to have been exposed to the teaching technique. Thus about 16% of the male Academic students indicated they had seldom or never been exposed to TV lectures. Compared to the proportion of students who marked the "Seldom" or "Never" response categories, the 16% is higher than we might expect. A minus sign atop a column indicates fewer students than we should expect under the 3-way contingency test. No mark atop a column indicates that the number of students did not deviate appreciably from that which was expected.

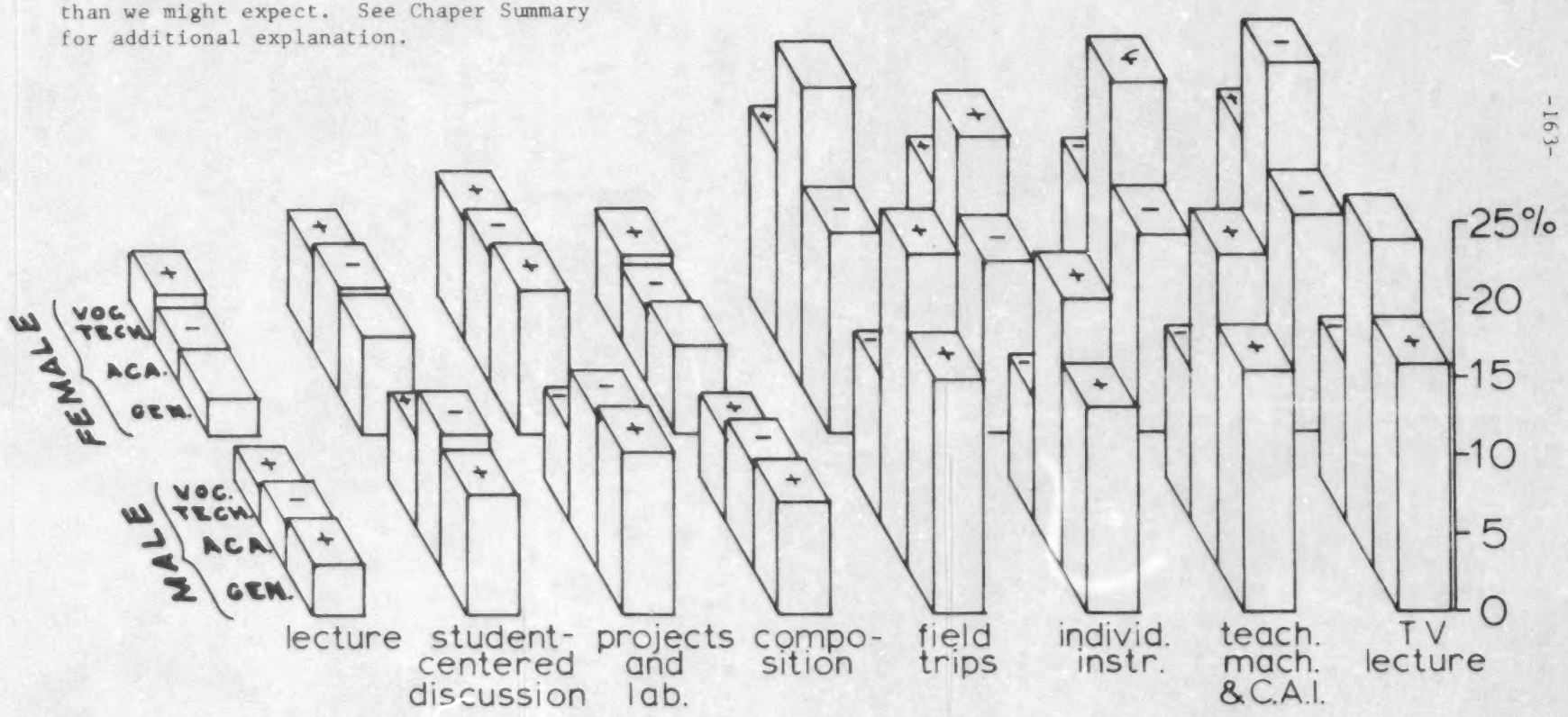
Figure 6-2 reveals at a glance that field trips, individualized instruction, teaching machines and computer-assisted instruction, and TV lectures are comparatively infrequently applied while the remaining techniques are more popular.

In seven of the eight techniques the numbers of Voc.-Tech. females who seldom or never receive special teaching techniques is larger than one might expect. The number of male General students who indicated they seldom or never received the teaching techniques was appreciably higher than expectation in all of the eight teaching techniques. More balance was evident for other combinations of sex and curriculum.

Figure 6-2

Proportions of Students Who Seldom or Never Receive Special Teaching Techniques

Illustration: Approx. 17% of all male General students indicated they had seldom or never been exposed to TV lectures. This is proportionally a larger number of such students than we might expect. See Chaper Summary for additional explanation.



CHAPTER 7

FINANCIAL BARRIERS TO CONTINUED EDUCATION

INTRODUCTION

The question of financial barriers to continued education revolves about four basic issues: first, whether the high school senior, given the opportunity, would desire to obtain education beyond high school; second, presuming a desire for additional education, whether there is a need for financial assistance; third, presuming the need, whether the student is fully aware of his options for overcoming the financial barrier; and finally, whether the student does all that he can to overcome the barrier through the discovery and exercise of his options.

The National Longitudinal Study was not designed to respond directly to the issues -- at least not in the Base Year study. It did, however, retrieve a quantity of related information which, when assembled and analyzed, sheds some light upon many of the issues.

In this chapter we make use of the available data to illuminate the problem of financial barriers to continued education.

ISSUES AND ANSWERS

There were two kinds of data in the Student Questionnaire from which one might discover whether the student was considering the furtherance of his education. The first lies in the route selected by the student in completing the Questionnaire since certain sections were to be completed by students planning to go to college, other sections were to be completed by students planning to go to a vocational or technical school, etc. This form of data is not as suitable as might be supposed since the completion

of certain sections of the Student Questionnaire was predicated upon the student's plans for the year after high school. The student who would have liked to go to college, but who felt himself barred financially from doing so, might plan to work during the year after high school. Hence the section of the Questionnaire regarding college education would not have been completed.

The second kind of data which relates to the furtherance of education is to be found in particular questions dispersed throughout the Questionnaire. There are a number of such questions, but it was decided to rely upon only one of them -- Item 81 -- since this item was to be answered by all students, regardless of the completion or noncompletion of other sections of the Questionnaire, and since it was the only item to ask of the student what he would like to do, assuming no barriers, during the year after high school.

A summary of responses to Item 81 appears in Table 7-1. As the table indicates, a large proportion of the students -- 54% of them -- would like to continue some form of education during the year after high school.

Whether these students will be able to fulfill this desire will depend upon a number of factors, and of course, money is one of them. Item 23 of the Questionnaire indicated (1) that about 41% of the high school class did not face a financial barrier, and would not seek financial support for their educations, since either they or their parents would be able to pay for it without outside help. In this same item, 23% of the students indicated they did not plan to further their education (2). Presumably, then, some form of outside financial aid would be useful to 36% of the students, nearly half of the 77% who might later obtain additional education (3).

Table 7-1

Responses to Student Questionnaire Item 81
("If there were no obstacles, what would you most like to be doing during the year after you leave high school?")

Alternatives	Percentage of Students Selecting Alternative							
	Male	Female	Gen.	Aca.	Voc.-Tech.	White	Black	Total
Working full-time	22%	21	29	8	40	21	31	22
Entering an apprenticeship or on-the-job training program	5	2	5	2	5	4	4	4
Going into regular military service or to a service academy	5	1	4	2	4	3	3	3
Being a full-time homemaker	--	7	4	2	5	4	1	3
Attending a vocational, technical, trade, or business school	6	9	9	4	13	7	11	8
Taking academic courses at a junior or community college	7	7	7	8	4	7	4	7
Taking technical or vocational subjects at a junior or community college	4	4	5	4	5	4	4	4
Attending a four-year college or university	33	30	17	53	8	31	32	31
Working part-time	2	3	4	1	4	3	3	3
Other (travel, take a break, no plans)	15	16	16	16	13	17	5	15

Source: National Longitudinal Study, Appendix B-II, Table B-378.

Apart from a student's ability to generate needed funds from his own labors, or from the efforts of his family, the primary source of funds lies in loans and scholarships. The capability of a student to make use of these sources certainly depends upon knowledge of their existence, and upon still more knowledge of how to go about applying for them. In part, these knowledges will depend upon the quality of counseling provided the student by the educational system. Here we may observe the responses of counselors to Item 7 of the Counselor Questionnaire, and those of students to Item 22 of the Student Questionnaire. Selected summaries of these items are presented in Table 7-2.

For each of the sources of financial aid, counselors were asked whether they had ever recommended the source to any student and, if so, whether any student had used the source. For the same sources of financial aid, students were asked whether they planned to use the source to aid their further education, or whether they felt they knew so little of the source that they could not answer the question.

The relatively high proportion of counselors who recommended certain sources of aid is heartening, but the low recommendation of several sources of aid is not -- all of the 18 listed sources had been recommended by 2/3 or less of the counselors. In general, one can observe a relationship between the reported incidents in which students used certain sources (Column 2) and the rate with which counselors reported recommending the sources (Column 1). This association suggests that knowledge provided the student by the counselor is a factor in whether a student makes use of the options available to him.

Table 7-2

Recommendation, Use and Knowledge of Financial Aid Sources

Source of Financial Aid	Counselors*			Students**		Students**	
						White	Black
	1	2	3	4	5	6	7
College of university scholarship or loan	91	89	8	21	14	12	20
State or local scholarship or loan program	88	90	6	20	15	14	23
Scholarship from private organization or company	84	80	12	10	18	15	28
G.I. Bill compensation or pension	68	67	21	5	18	16	28
ROTC Scholarship Program	71	47	22	3	18	14	24
College Work-Study Program	82	79	16	17	21	21	23
Social Security Benefits for Students Age 18-22	70	75	18	9	15	13	22
National Defense Student Loan Program	84	73	22	7	24	22	31
Federal Guaranteed Student Loan Program	67	57	36	7	28	26	35
Educational Opportunity Grant Program	67	69	21	6	28	27	32
Health Professions Student Loan Program	46	33	43	2	26	24	35
Health Professions Scholarship Program	50	40	37	2	25	23	34
Nursing Student Loan Program	62	46	37	2	18	16	25
Nursing Scholarship Program	66	56	30	2	18	16	25
General Scholarship Progra	66	75	16	7	24	23	31
Law Enforcement Education Program	40	28	36	2	21	19	29
Veterans Admin. War Orphans Ed. Asst. Program	43	48	28	1	19	17	28
Regular Bank Loan	65	52	38	21	11	10	17

Explanation of Columns:

Column 1--Percentage of counselors who indicated they had recommended the source of aid.
Column 2--Percentage of those in Column 1 who indicated a student had used the source of aid.
Column 3--Percentage of those in Column 1 who indicated they did not know whether student had used the source of aid.
Column 4--Percentage of students who indicated their intention to use the source of aid.
Column 5--Percentage of students who indicated they knew so little about the source of aid that they could not respond to the question.
Columns 6, 7--Redistribution at Column 5 by Race.

*Source: National Longitudinal Study, Appendix D, Tables D-35 through D-70, pp. D-69 through D-140.

**Source: National Longitudinal Study, Appendix B-I, Tables B-124 through B-141.

One may observe also that, with the single exception of bank loans, whenever 10% or more of the students indicated their intent to use a source it also happened that over 80% of the counselors had recommended it; conversely, whenever 80% or more of the counselors had recommended a source at least 10% of the students intended to use it, the sole exception being the high recommendation and low student use of the National Defense Student Loan Program.

Despite the associations, we may yet observe that relatively high proportions of counselors did not followup their recommendations to students to determine whether the student had made application to a source of funds nor, apparently, to determine whether additional knowledge or help was needed by the student. Moreover, relatively high proportions of students reported that they knew too little about the sources to respond to the question, thereby increasing the suspicion that lack of knowledge may be a serious factor in the student's perception of a financial barrier and, subsequently, the inability to maximize his capability of coping with the barrier.

In order to test this line of reasoning a series of contingency tests were decided upon. To do so it was necessary to examine the degree to which students were ignorant of the sources of financial aid listed in Table 7-2. It was found that 53% of all students indicated no lack of knowledge. An additional 20% indicated a lack of knowledge concerning from one to four of the sources listed. The remaining 26% indicated a lack of knowledge affecting five or more of the sources -- about 2% indicated they could not answer the question concerning any of the courses owing to their lack of knowledge of the source.

From these results, three levels of ignorance were determined:

low ignorance:	Student indicates no lack of knowledge for any source,
medium ignorance:	Student indicates lack of knowledge on 1, 2, 3, or 4 of the sources,
high ignorance:	Student indicates lack of knowledge on 5 or more sources,

and students were categorized accordingly.

Next, students were categorized according to whether they mentioned lack of money as a factor which might prevent further education. Such information was extracted from a variety of items in the Student Questionnaire (Items 37, 42, 46, 49, 54, 64, 68, and 80). These items were highly similar in content but located in different sections of the Questionnaire (to be answered by certain students and not others, depending upon the students' plans for the year following high school) and usually indicated a need to earn money to support a family or to pay for further schooling. A student who indicated such a need for money, and who also did not indicate that either he or his parents could pay for his education (Item 23 already mentioned) was considered to have perceived a financial barrier to his further education.

Students were then separated according to their curriculum (General, Academic, or Vocational-Technical) since these 3 groups might have divergent post-high school educational needs, and further separated according to their after-high school preferences. These preferences were taken from Item 81 of the Student Questionnaire, which asked what the student would prefer to do if there were no obstacles, reclassified into the following four groups:

Prefer to work:	Students indicating a preference for full-time or part-time work, or on-the-job/apprenticeship training.
Prefer vocational schooling:	Students indicating a preference for attending a vocational, technical, trade, or business school, or a junior or community college to study technical or vocational subjects.
Prefer academic schooling:	Students indicating a preference for taking courses at a junior or community college, or to attend a 4-year college or university.
Other preference:	Students indicating a preference for the military, for becoming a homemaker, travel, taking a break from work/study, etc.

Having classified students in this manner, twelve groups of students were formed according to their curriculum and their post-high school preferences, a cross-classification which should reasonably separate the divergent goals of the student into coherent groups. Within each of the 12 groups formed in this manner the 2-way contingency of financial barrier vs. ignorance of sources of financial aid was tested by Chi-square with 2 degrees of freedom.

In verification of the reasoning presented, each of the 12 groups of students produced a significant Chi-square, with deviations which illustrated, in every case, a surplus of students who perceived a financial barrier and who also were in the "high ignorance" group, a lack of students in the "financial barrier" group who were in the "low ignorance" group, and in 10 of the 12 cases, an appreciable lack of students in the "high ignorance" group who were also in the "no barrier" group. A more complete summary of these results appears in Table 7 -3.

Table 7-3

Tests for Dependency of Financial Barriers
and Levels of Ignorance of Students Concerning Sources
of Financial Aid

Curriculum	Post-High School Preference	Chi-Square test	Sig. level	Sub-sample Size	Pattern*
General	Working	8.72	.050	1940	Positive
	Voc. School	12.35	.005	722	Positive
	Aca. School	19.61	.005	1195	Positive
	Other	11.62	.005	1130	Positive
Academic	Working	19.60	.005	730	Positive
	Voc. School	17.25	.005	535	Positive
	Aca. School	50.18	.005	4136	Positive
	Other	35.79	.005	1374	Positive
Voc.-Tech.	Working	22.99	.005	1936	Positive
	Voc. School	27.08	.005	683	Positive
	Aca. School	10.40	.005	478	Positive
	Other	9.53	.010	975	Positive

*A positive pattern is one in which an excessive number of students were found who (a) perceive a financial barrier to their further education; and also (b) belong to the "high ignorance" group regarding sources of financial aid.

The results of these 12 tests clearly suggest that the training and counseling of students should emphasize the kinds of financial aid which are available for the furtherance of their educations and the administrator's procedures by which applications for aid are effected.

Notes

(1) National Longitudinal Study, Appendix B-I, Table B-143.

(2) National Longitudinal Study, Appendix B-I, Table B-142.

(3) The 77% cited here, and the 54% of the previous paragraph are not necessarily in conflict since the 54% relates to students who would like to continue their education during the next year, given no obstacles, while the 77% incorporates no time limit and includes students who, while perhaps not actually intending to further their educations at this time, have nonetheless made no plans against it.

CHAPTER 8

REMEDIAL INSTRUCTION

INTRODUCTION

Item 8 of the Student School Record Information Form asked whether a student had been involved in remedial programs in reading and mathematics and, if so, the number of semester hours of such instruction. Difficulties in the reliability of the semester hours figures were noted in the National Longitudinal Study which question its utility as an analysis variable. The incidence of remedial instruction, however, presented no such difficulty. In consequence, we are able to undertake a limited study of remedial instruction in its relation to sex, race, and curriculum. By comparing remedial students with others we may extend the exploration to provide additional insight regarding the remedial student.

REMEDIAL READING

Incidence

Remedial instruction in reading was provided to about 6-1/2% of the students in the high school class of 1972. The incidence rate for White students was about 4-1/2%; for Black, about 14-1/2%. Among the three curricula, Academic students had the lowest rate of incidence--about 2%--while General and Voc.-Tech. students had appreciably higher rates--8% and 9-1/2%, respectively. The rate for females (4-1/2%) was appreciably lower than that for males (7%).

To obtain a more complete view of these results a series of Chi-square tests were performed to test for significant differences in the incidence rates for various subgroups of the sample.

The first such analysis was an analysis by race and sex. The results of the test were highly significant ($\chi^2_3 = 356.31$, $p < .001$), and are shown

diagramatically in Figure 8-1. It can be seen that the incidence rates for females is lower than that of males of corresponding race, but the rate for White males is lower than that of Black females. The Chi-squares contributions show that the greatest deviations from the overall incidence rate occur first for Black males, second for Black females, and third for White females whose incidence is appreciably lower than the average. White males are sufficiently close to the overall rate that no appreciable Chi-square contribution is noticeable.

The second Chi-square test was applied to determine whether the incidence rate was equal for the six sex x curriculum subgroups. This test produced, with 5 degrees of freedom, a Chi-square value of 425.72 ($p < .001$). Figure 8-2 displays these results. General curriculum students of both sexes and Voc.-Tech. males have elevated incidence rates, with Voc.-Tech. males having the highest incidence rate. The rate for Voc.-Tech. females does not appreciably differ from the overall rate. Academic students of both sexes have incidence rates which are appreciably below the average.

A parallel analysis was conducted for six race x curriculum subgroups in the sample ($\chi^2_5 = 628.87$, $p < .001$). As Figure 8-3 shows, the incidence rates for General and Voc.-Tech. students of both races is appreciably higher than that of Whites. Black Academic students had a rate comparable to that of the population, but that of White Academic students was appreciably lower.

The final analysis for incidence compared the rates for the three curricula within each race x sex subgroup separately. All four Chi-square tests were highly significant ($p < .001$) and are displayed in Figure 8-4. As can be seen, Academic students are less likely to receive remedial reading instruction than their peers of similar race and sex. The rates for General

Figure 8-1

Remedial Reading, by Sex & Race

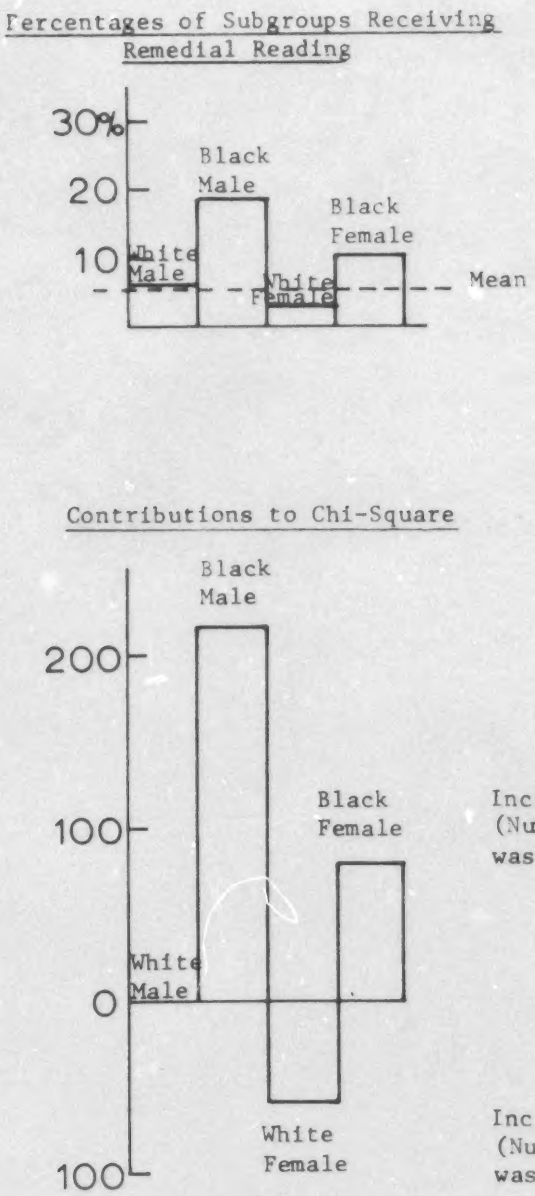
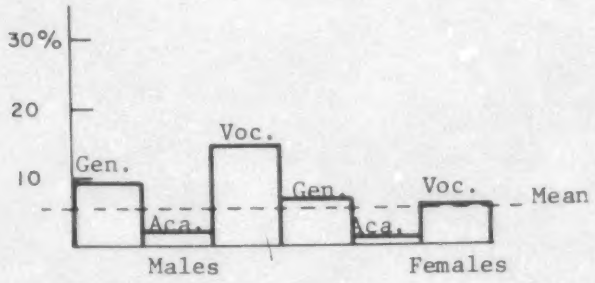


Figure 8-2

Remedial Reading by Sex & Curriculum

Percentages of Subgroups Receiving Remedial Reading



Contributions to Chi-Square

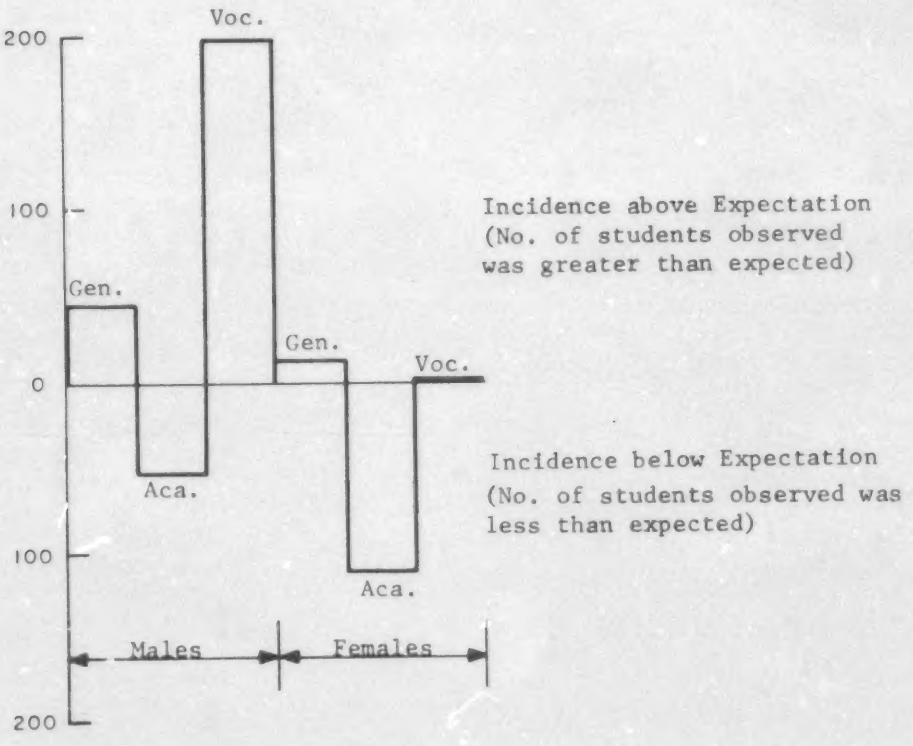


Figure 8-3

Remedial Reading by Race & Curriculum

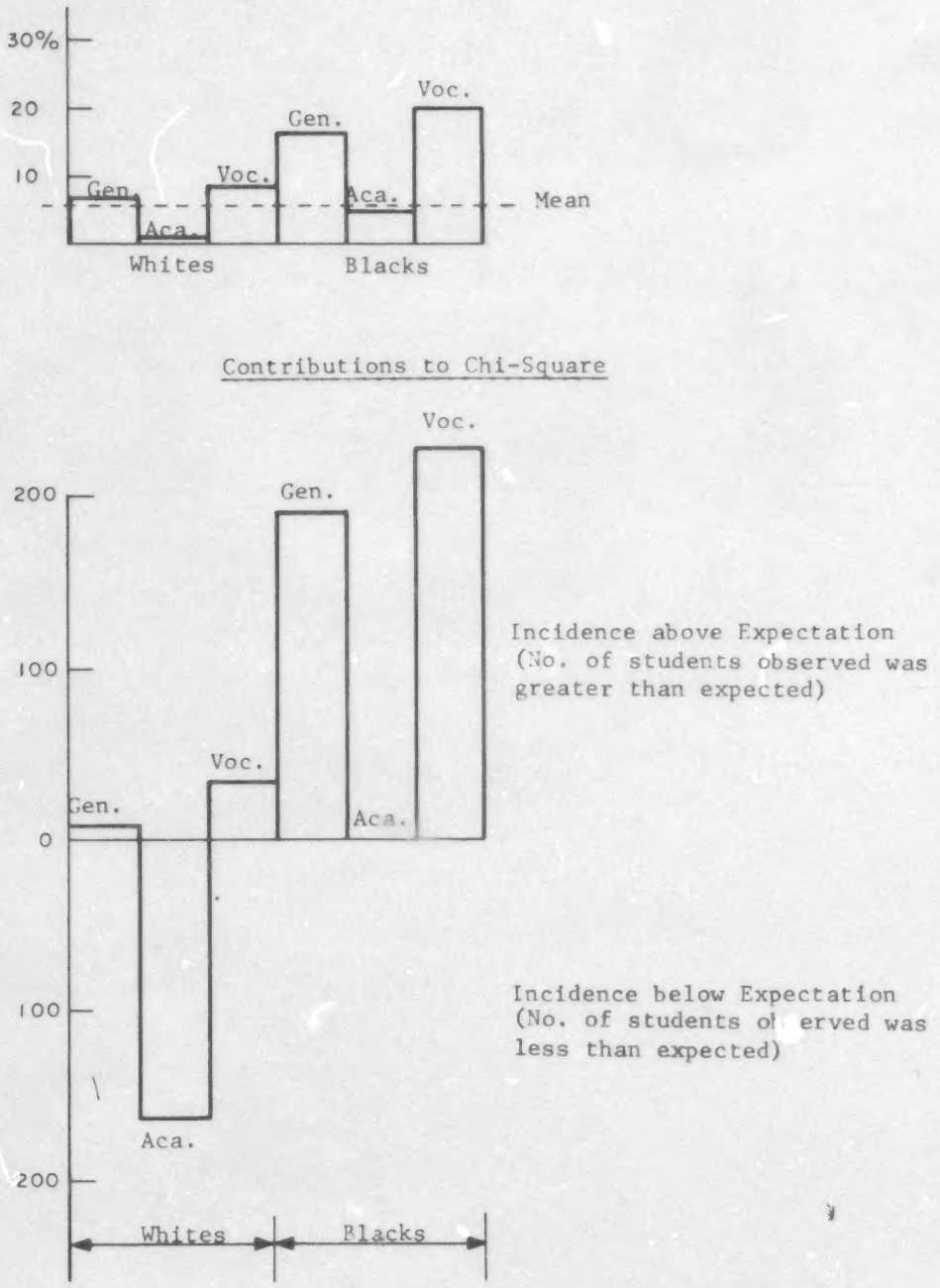
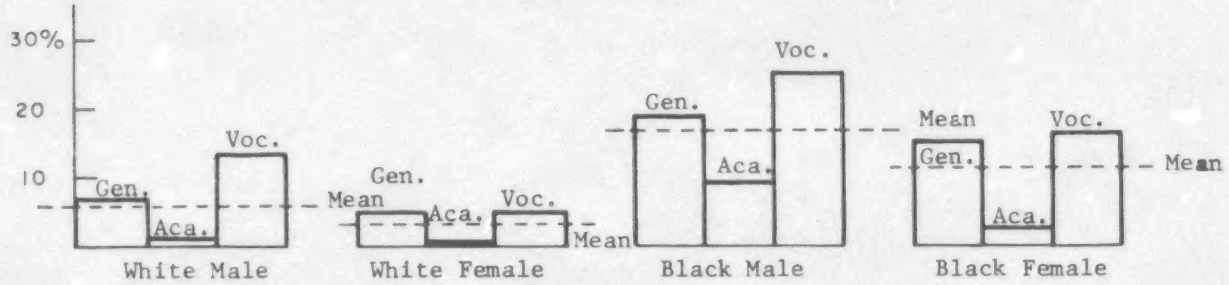
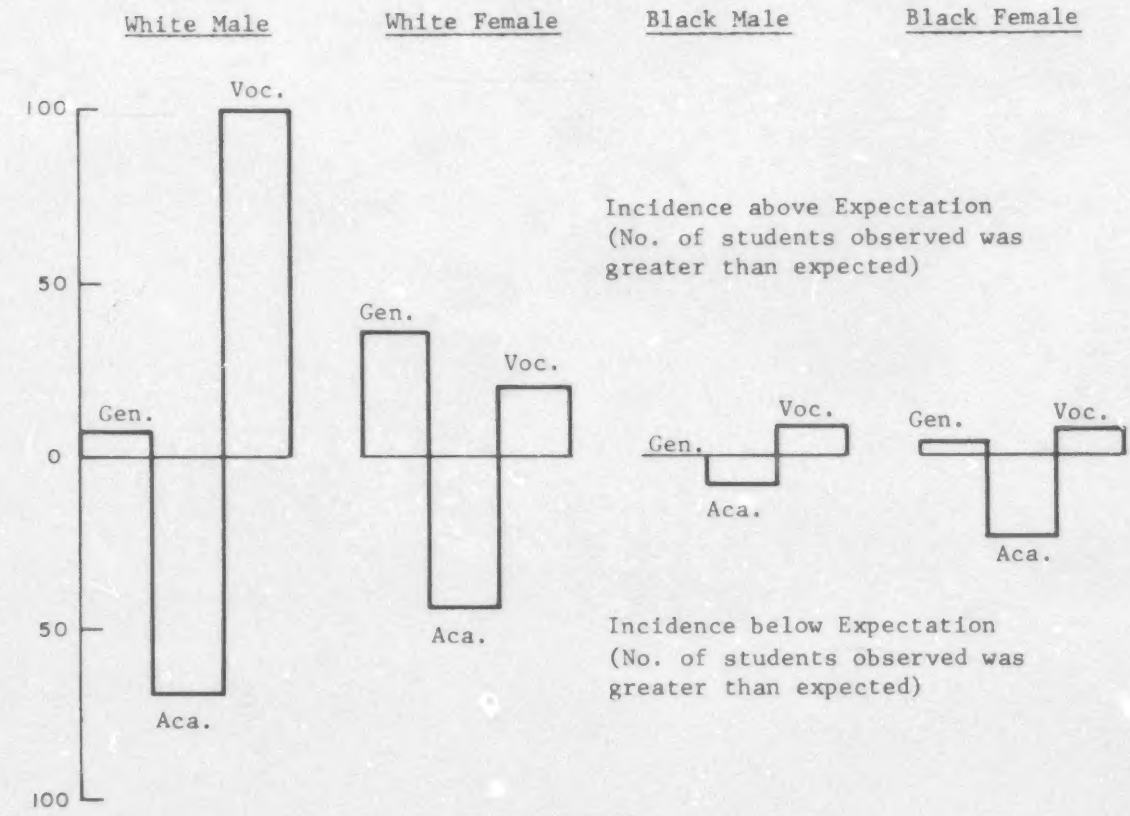


Figure 8-4

Remedial Reading by Curriculum for Race x Sex Subgroups





and Voc.-Tech. students are elevated, generally with the Voc.-Tech. rate exceeding the General rate. The exception is White females for whom there is no appreciable difference between General and Voc.-Tech. students. As seen earlier, the rate for Blacks is higher than for Whites.

Comparisons with Non-Remedial Students

The several variables of the Student Test Battery, together with factor analysis derived measures of ability, socioeconomic status, and educational press formed the basis for a series of comparisons between remedial reading students and other students (in the same curriculum) who were not involved in remedial programs.

The standardized differences found between remedial and other students are displayed in profile form in Figure 8-5. It should be noted that the scale is that of standardized differences (standard errors of difference) between the means of the two groups of students on each of the several variables. The scale thus reflects the significance of the test. It does not, however, indicate the average distance between remedial students and others. This measure is provided in Table 8-1, where non-remedial students are taken as a standard and the distance between non-remedial and remedial students is given in standard deviations instead of standard errors.

The most striking feature of Figure 8-5 and Table 8-1 is the fact that deviations on all scores are negative, simplying that the scores of remedial reading students are, on the average, lower than those of non-remedial students. In Figure 8-5 a two-standard error deviation can be considered significant ($p < .05$) and a three-standard error deviation can be considered highly significant ($p < .01$). Thus, practically all results are signficant or highly significant. The exceptions are: (a) Mosaic Comparisons (3)--a test of perceptual

Figure 8-5

Standardized Differences Between Means of Remedial Reading Students and Non-Remedial Students

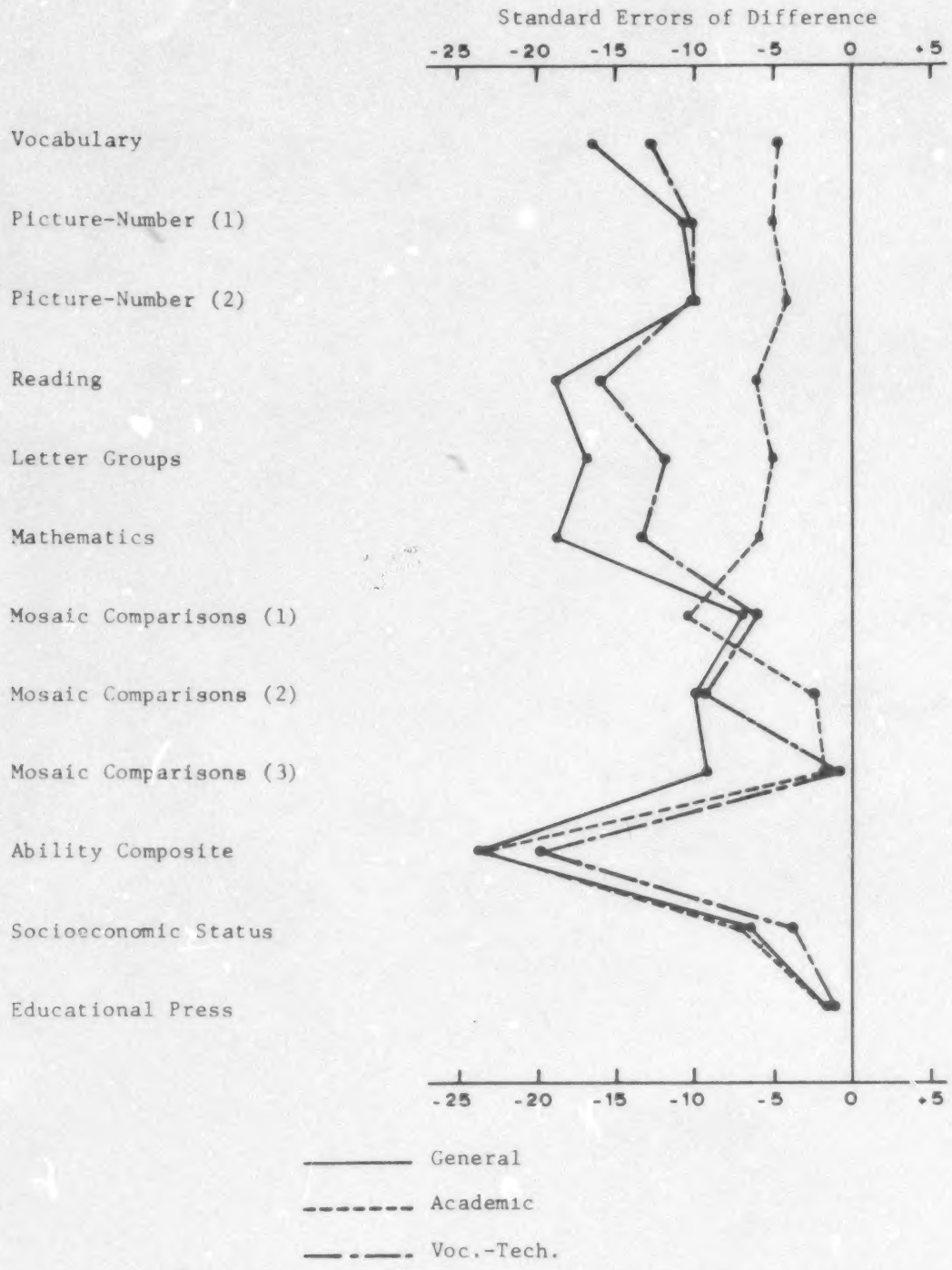


Table 8-1

Mean Remedial Reading Scores Compared To
Non-Remedial Students As A Standard

Variable	Standard Deviations of Difference		
	General	Academic	Voc.-Tech.
Vocabulary	-.72	-.40	-.72
Picture-Number (1)	-.50	-.43	-.55
Picture-Number (2)	-.48	-.36	-.56
Reading	-.84	-.52	-.88
Letter Groups	-.84	-.42	-.64
Mathematics	-.78	-.51	-.74
Mosaic Comparisons (1)	-.37	-.09	-.33
Mosaic Comparisons (2)	-.56	-.23	-.50
Mosaic Comparisons (3)	-.48	-.16	-.53
Ability Composite	-.99	-.61	-1.09
Socioeconomic Status	-.37	-.20	-.23
Educational Press	-.14	-.06	-.12

power--is not appreciably lower for remedial Academic and Voc.-Tech. students than it is for non-remedial students, and (b) the Educational Press variate is not appreciably different for remedial and non-remedial students.

The mean scores of General and Voc.-Tech. students are especially low in Vocabulary, Reading, Letter Groups, Mathematics, and Ability. For the Ability Composite variable, the mean of these two groups of students is located about one standard deviation below the mean of the non-remedial students and the significance test indicates 20 or more standard errors of difference, making this the single most deviant score. As can be seen in Table 8-1, the distances from the means of the remedial Voc.-Tech. and General students to the non-remedial students are highly similar. Were their standard deviations of Table 8-1 plotted as a profile there would be little to distinguish them.

Academic students do not fare so poorly as others in remedial reading--their scores are appreciably higher, but still lower than those of non-remedial students. Their mean Ability Composite is located .61 standard deviations below that of non-remedial Academic students, compared to the full standard deviation of General and Voc.-Tech. students, and the significance test of Ability shown in Figure 8-5 attained over 23 standard errors of difference, making Ability the most deviant score for Academic as well as other remedial reading students.

REMEDIAL MATHEMATICS

Incidence

Remedial mathematics instruction was provided to about 4% of the high school class of 1972. The incidence rate for White students was about 3%; for Blacks, about 11%. Among the three curricula, Academic students had the

lowest rate--about 1-1/2%--while General and Voc.-Tech. students had appreciably higher rates--6% and 5-1/2%, respectively. The rate for females (3%) was appreciably lower than that for males (4-1/2%).

In parallel to the Chi-square tests applied to remedial reading students, a series of tests was applied to remedial mathematics students to determine whether the incidence rates were similar among various subgroups of the sample.

The Chi-square analysis by sex and race (Figure 8-6) was highly significant ($\chi^2_3 = 328.95$, $p < .001$), and indicated that the rates for males exceeded that for females, that for Blacks exceeded that for Whites, and that only White females had a below-average incidence of remedial mathematics instruction.

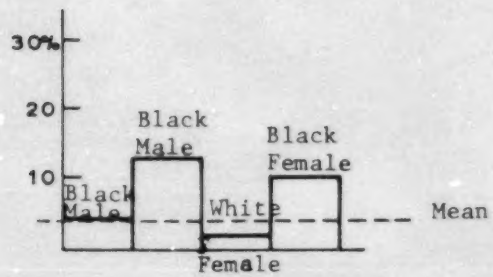
The analysis by sex and curriculum (Figure 8-7) attained a Chi-square of 223.09 with 5 degrees of freedom ($p < .001$). The proportion of students in General curricula who received remedial mathematics instruction was higher than the average for both sexes. Voc.-Tech. males had the highest incidence rate, however, and the remaining subgroups had rates which were slightly below average.

The two analyses described above were similar in pattern to that produced by remedial reading students. The analysis by race and curriculum (Figure 8-8), however, produces a slightly different pattern. Black General and Voc.-Tech. students are higher in incidence of remedial mathematics instruction than the average and Black Academic students are at the average (this pattern is also found in remedial reading). White students, however, have average-or-below remedial mathematics rates while White General and Voc.-Tech. students have above-average remedial reading rates.

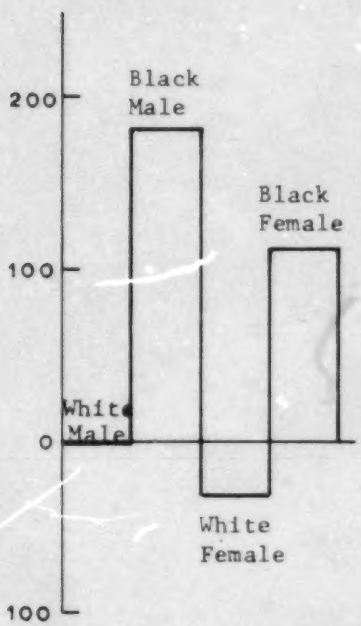
Figure 8-6

Remedial Mathematics, by Sex & Race

Percentages of Subgroups Receiving Remedial Mathematics



Contributions to Chi-Square



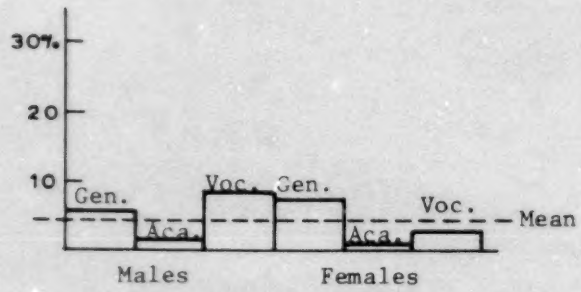
Incidence above Expectation (No. of students observed was greater than expected)

Incidence above Expectation (No. of students observed was less than expected)

Figure 8-7

Remedial Mathematics, by Sex & Curriculum

Percentages of Subgroups Receiving Remedial Mathematics



Contributions to Chi-Square

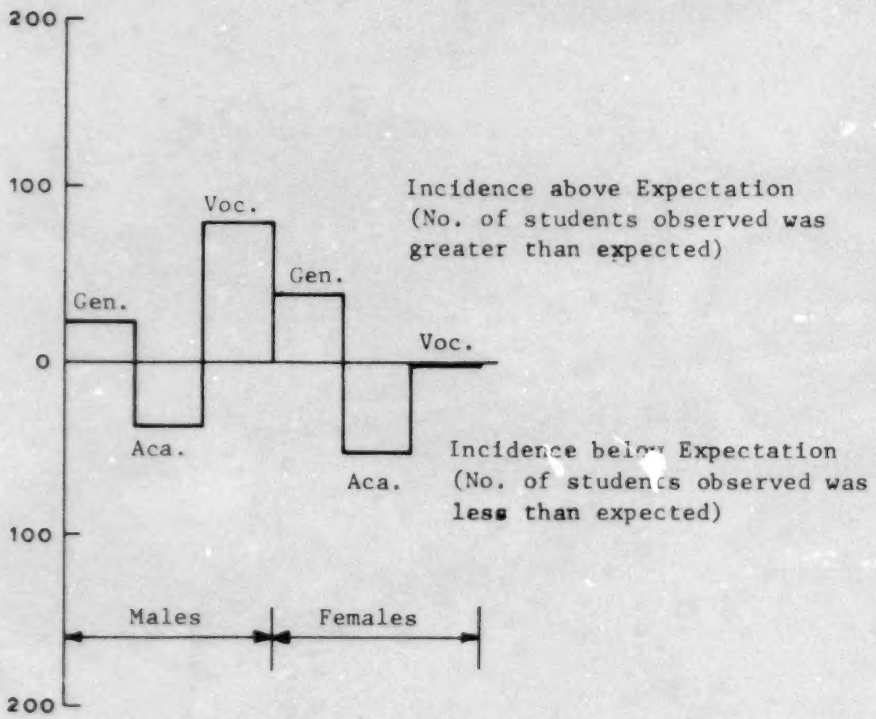
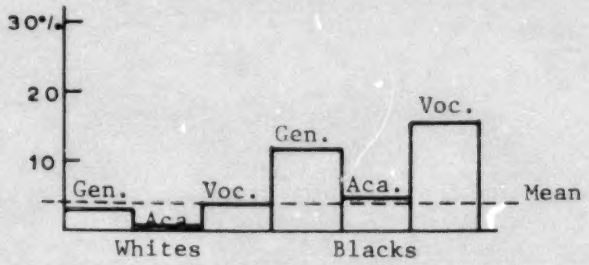


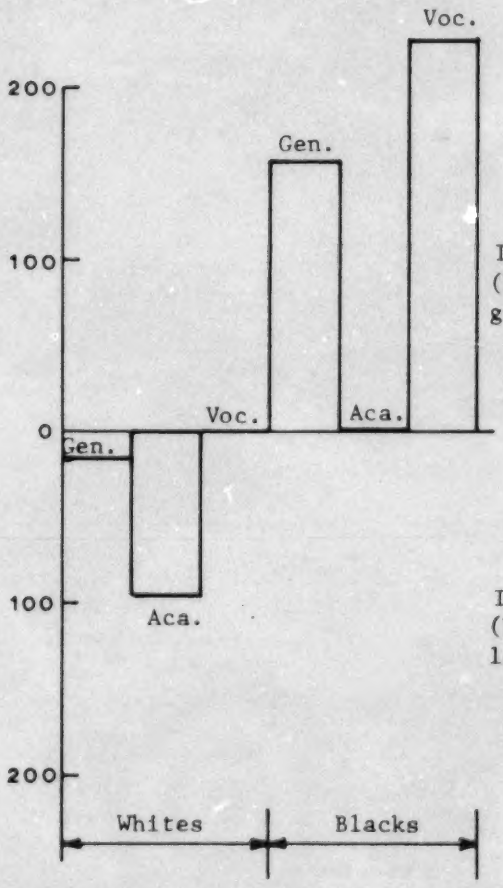
Figure 8-8

Remedial Mathematics, by Race & Curriculum

Percentages of Subgroups Receiving Remedial Mathematics



Contributions to Chi-Square



Incidence above Expectation (No. of students observed was greater than expected)

Incidence below Expectation (No. of students observed was less than expected)

In Figure 8-9 are displayed the four analyses of sex x race within curriculum. The pattern produced is basically the same as that found for remedial reading students: the rates for Whites are lower than those for Blacks, the rates for General and Voc.-Tech. students exceed those for Academic students, and the proportion of Academic students receiving remedial mathematics instruction is below average while that of students in other curricula is above average.

Comparisons With Non-Remedial Students

The set of variables used to compare remedial reading and non-remedial students was again used in the comparison of remedial mathematics students. Figure 8-10 shows the resulting significance test results in standard errors of difference between the means of the two groups and Table 8-2 provides the corresponding standard deviations.

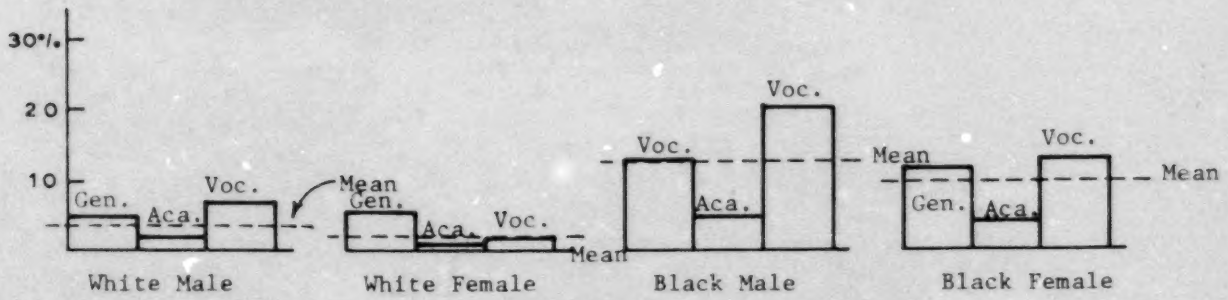
As with remedial reading students, practially all variables (all but Educational Press) showed remedial mathematics students as scoring significantly lower than non-remedial students. Reading, Mathematics, and Ability were the lowest variables, with Ability being the absolute lowest. Table 8-2 shows that Voc.-Tec. remedial students are consistently further below non-remedial Voc.-Tech. students than are the remedial students in other curricula. In Reading and Mathematics these students are located about one full standard deviation below the comparison group, and in Ability they are loacated 1.36 standard deviations below.

In remedial reading it was noted that, for Academic students, the difference between remedial and non-remedial students was less than for students of other curricula. In the case of Mathematics this does not seem to be the case--the location of Academic students is very similar to that of General students.

Figure 8-9

Remedial Mathematics by Curriculum for Sex x Race Subgroups

Percentages of Subgroups Receiving Remedial Mathematics



Contributions to Chi-Square

White Male White Female Black Male Black Female

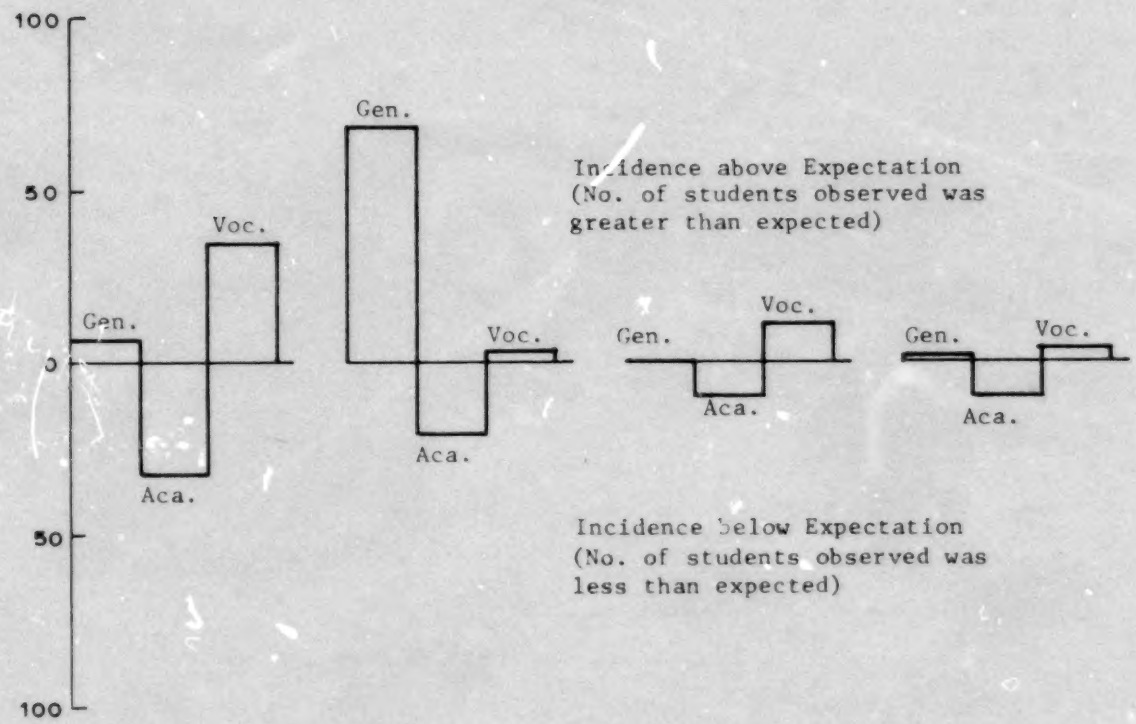


Figure 8-10

Standardized Differences Between Means of Remedial Mathematics Students and Non-Remedial Students

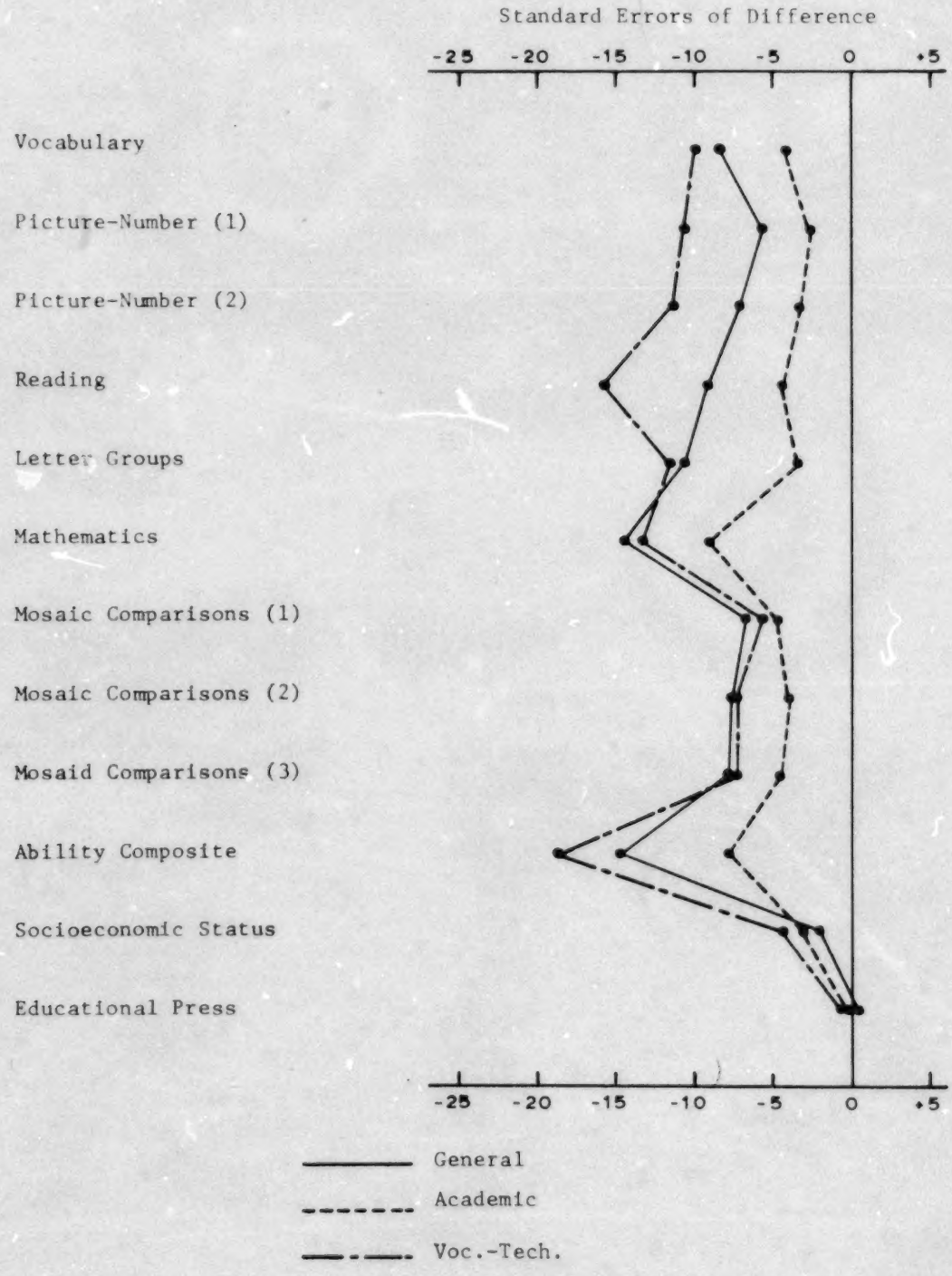


Table 8-2

Mean Remedial Mathematics Scores Compared To
Non-Remedial Students As A Standard

Variable	Standard Deviations of Difference		
	General	Academic	Voc.-Tech.
Vocabulary	-.49	-.45	-.72
Picture-Number (1)	-.34	-.28	-.77
Picture-Number (2)	-.41	-.35	-.82
Reading	-.54	-.46	-1.15
Letter Groups	-.61	-.36	-.83
Mathematics	-.86	-.79	-.96
Mosaic Comparisons (1)	-.39	-.49	-.41
Mosaic Comparisons (2)	-.44	-.41	-.52
Mosaic Comparisons (3)	-.46	-.48	-.52
Ability Composite	-.89	-.80	-1.36
Socioeconomic Status	-.14	-.33	-.33
Educational Press	+.06	-.07	-.11

SUMMARY

By comparing the incidence rates with which various subgroups of students receive remedial instruction in reading and mathematics, it was determined that (a) relatively more Blacks than Whites, (b) relatively more General and Voc.-Tech. students than Academic students, and (c) relatively more male than female students receive such instruction. The patterns of incidence in remedial reading were found to be highly similar to those in remedial mathematics.

Comparisons of remedial and non-remedial students showed strong and systematic decrements in the scores of remedial students compared to non-remedial students. This was found for both remedial reading and remedial mathematics students of all curricula. The greatest differences between remedial and non-remedial students involved both verbal and quantitative variates, as well as other variates, suggesting an ability decrement of broad spectrum rather than isolated disabilities in reading or mathematics. The composite Ability variate developed during the National Longitudinal Study produced a greater difference between remedial and non-remedial students than any of the other 11 variables tested. This was true for both remedial reading and mathematics and for students of all curricula.

Students of General and Voc.-Tech. curricula in remedial reading were relatively disadvantaged compared to their peers, while the decrement for Academic students was of lesser magnitude. In remedial mathematics General and Academic students were distinctly less disadvantaged than were Voc.-Tech. students. Thus, both reading and mathematics Vocational-Technical remedial students were found to possess relatively serious deficits in a broad spectrum of intellectual and other measures.

CHAPTER 9

SUMMARY

The eight reports brought together in this volume were based upon data collected for the base year of the National Longitudinal Study of the High School Class of 1972. Nearly 18,000 students were involved in the study, students who could reasonably be expected to complete their secondary school education prior to September 1, 1972.

The report of that project indicated that minor but systematic biases were present in the data since certain schools and students did not participate in the survey. In particular, small schools, often in the South, often in rural areas tended not to participate. Nonparticipant students tended to be not academically oriented, had lower standing in their class, were more mobile, and more likely to have one or more learning disabilities. In the current study this type of analysis was continued to compare students who answered every necessary question (full participants) with students who improperly omitted one or more questions (partial participants). It was found that students who planned to work and to take vocational or technical courses during the year following high school had the lowest rate of full participation. Academic curriculum students tended to produce a high rate of full participation. Full participants also tended to stand higher in their class than did partial participants. Thus, partial participation seems somewhat similar to nonparticipation and, therefore, the bias effects should be additive, not compensatory. Both the earlier report and the current one found the amount of bias to be small in most circumstances; however, the accumulative effects of bias emphasize the need for care in analysis and interpretation.

The high school class of 1972 consisted of about 3 million persons, about 82% of them White, 9-1/2% of them Black. The rest were from smaller minority groups. Subsample sizes were inadequate to do more with the smaller minorites, but it was found that, while the sexes were equally represented for Whites, Black males comprised only 45% of all Blacks. About half of the White students were enrolled in Academic curricula, which compares to a quarter of the Black students. Close to half of the Black students (44%) were enrolled in General curricula, which compares to 29% of all White students.

A set of six tests (vocabulary, picture-number, reading, letter groups, mathematics, and mosaic comparisons) were administered to the sample students. Uniformly, females slightly outperformed males, Academic students outperformed other students, and Blacks scored about a standard deviation below Whites. Exceptions to this pattern include the fact that males slightly outperformed females in mathematics. The median class standing of females was substantially (17%) higher than that of males and that of Vocational/Technical students was about 6% higher than that of General students.

The socioeconomic status of these students was examined from a variety of viewpoints, with highly consistent results. The SES level of Academic students was appreciably higher than that of General students who had, in turn, a slightly higher SES level than that of Vocational/Technical students. Blacks were found to have a markedly lower SES than Whites.

Student participation in federal programs was examined for the following five programs:

Cooperative Vocational Education Program (Co-op)

High School Vocational Education Work-Study Program (Work-Study)

Neighborhood Youth Corps (NYC)

Talent Search

Upward Bound

Collectively, these programs enroll about 741,000 students--a[illegible] the population. The Work-Study program was the largest, enroll[illegible] 277,000 students--roughly 10% of the population. Talent Search and Upward Bound each enrolled less than 2% of the students. Participation rates in these programs were similar for the two sexes, but differed between races and among curricula. Voc.-Tech. students tended to be heavily enrolled in the Co-op and Work-Study programs (about 1/5 of all Voc.-Tech. students were in each program). General and Academic students were much less likely to be found in these two programs. The Neighborhood Youth Corps enrolled about 8% of the General and Voc.-Tech. students and about 4% of the Academic students. Blacks were over-represented in all five programs, compared to their incidence in the population. Nearly a third of all Black students indicated their participation in the Neighborhood Youth Corps.

A composite measure of ability suggested that students in federal programs had somewhat higher ability scores than did students in the same curriculum who did not participate in federal programs. Self-reported grades did not reflect this advantage, and it was suggested that underachievement might be a factor. Compared to their same-curriculum peers (nonparticipants in federal programs), the participant was more likely to feel that teachers were not as helpful as they might have been, that

transportation to and from school was problematic, that parents were disinterested in their education, and that school facilities were substandard. On the other hand, they were more apt to feel that school counseling services were good and that the quality of teaching was adequate.

A number of significant differences were observed regarding the exposures of various types of students to various special teaching techniques. With the exceptions of student projects, laboratory work and television lectures, sex differences were generally noted. Such differences might accrue to the different courses selected by males and females and/or to the relative verbal facility and interest of females compared to males. Curriculum differences were generally observed, usually in a reasonable relationship between the curriculum and the teaching technique. For example, field trips were frequently reported by Voc.-Tech. students, seldom reported by Academic students, and even less frequently reported by General students. Voc.-Tech. female students and General male students may tend to be comparatively underexposed to the diversity of teaching techniques available. Field trips, individualized instruction, teaching machines and computer assisted instruction, and TV lectures were infrequently employed techniques compared to lectures, student-centered discussions, project and lab work, and composition writing.

About 1/3 of the population, that is, about one million of these students, may be facing a financial barrier to their continued education. It was observed that relatively large numbers of students were ignorant of many potential sources of financial aid. Moreover, there was a relationship between students use of financial aid sources and the frequency with which counselors recommended such sources. Because of such a relationship

it was hypothesized that a student's ignorance of potential aid might, in itself, constitute a portion of the perception of a financial barrier. The hypothesis was tested separately for 12 combinations of students (3 curricula x 4 post-high school preference categories). The hypothesis was supported in all 12 instances, suggesting that student counseling should clearly emphasize kinds of financial aid and the administrative procedures necessary to their application.

The incidence of remedial instruction in reading and mathematics was examined within a number of subgroups of the population. The pattern of incidence was found to be the inverse of the achievement/ability test pattern mentioned above--remedial instruction was relatively more frequently provided to Blacks than to Whites, to General and Voc.-Tech. students than to Academic students, and to more males than females. Students in remedial courses showed serious weaknesses in test performance for all tests in the battery, and additionally showed a slightly lower SES level than that found in nonremedial students.